

Photographic

Magazine



**AVAILABLE
DARKNESS**

HOW TO USE
HIGH-SPEED COLOR
FILMS IN DIM LIGHT
HOW TO SHOOT
E-6 COLOR FILM
AT AN INCREDIBLE
10,000 E.I.

• **FILMMAKERS'
WORKSHOP,
PART VII**

• **HOW TO SAVE
WATER IN YOUR
DARKROOM**

**AND MORE,
MUCH MORE**



NIKKORMAT

Pure camera, moderately priced

The new Nikkormat FT3 is a fast-handling, uncomplicated, yet highly versatile precision camera which delivers image quality second to none. Built by Nikon, it offers all the capabilities many photographers will ever need. And, because it is part of the renowned Nikon system, the FT3 also can be an easy step towards high performance photography in its most advanced forms.

Balance

It's the essence of the Nikkormat FT3. A physical balance which makes it wonderfully comfortable and natural to hold and operate. A balance in size, without the expense

of ultra-miniaturization. A viewfinder that provides superb image brightness without sacrificing focusing accuracy, for perfect visual balance. The result is a camera which is uniquely smooth and easy to use.

New Instant-Interchange AI-Nikkor lenses

All AI-Nikkor lenses, from 6mm through 600mm, can be interchanged more quickly than ever before. A quarter-turn, and the AI-Nikkor is securely in place, the meter programmed for exposure control at full aperture. Non-AI Auto-Nikkors can be used with stop-down metering or, in most cases, modified at low cost for AI operation (if interested,

write for Lit/Pak N-27). Non-meter-coupled lenses, through 2000mm, work in the stop-down metering mode, just as before.

Nikkor lenses have always been some of the very best reasons for owning a Nikkormat. Now there are more than 55 of them, incorporating the greatest range, the most optical innovations, the finest quality—both optical and mechanical—in 35mm photography. The FT3 also accepts many other accessories from the famed Nikon System, including closeup attachments, filters, lens hoods, flash units and more.

Supremely accurate center-weighted metering

Of the many through-the-lens metering systems available, none have been able to match Nikon center-weighting for all-around consistent accuracy, in almost any lighting imaginable. Simply center the needle—either in the finder (which also shows the shutter speed), or on top of the camera—and your exposure will be correct. You can adjust either the lens aperture or the uniquely handy shutter speed selector, located right behind the aperture ring. Focusing is equally fast and easy with the space-tested Nikon "K" screen, which provides split-image, microprism and overall ground glass focusing aids.

Every essential control built in

Yes, the FT3 is moderately priced, but without sacrificing quality. You'll find facilities you don't expect in such an affordable camera: speeds to 1/1000th, strobe synch at 1/125th, built-in hot shoe, threaded synch socket, mirror lock, depth-of-field preview, self-timer, even special provisions to keep the film extraordinarily flat. It all adds up to a sensationally good buy!

Nikon Information: For details on the Nikkormat FT3, check the Yellow Pages for the Nikon dealer nearest you, or write for Lit/Pak N-40. Also, ask about the new two-course traveling Nikon School of Photography. And in New York City, visit the new Nikon House in Rockefeller Center.

Nikon Inc., Garden City, N.Y. 11530. Subsidiary of Ehrenreich Photo-Optical Industries, Inc.  (In Canada: Anglophoto Ltd. P.Q.)

**Introducing the new Nikkormat FT3.
The easily affordable beginning of your own
Nikon system—enhanced by new
Instant Lens Interchange**



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this month

FEATURES

Spec Sheet	40
Sigma 18mm f/2.8 Wide-Angle Filtermatic, 28mm f/2.8 Wide-Angle Filtermatic and 70-150mm f/3.5 Macro Zoom Lenses	
Shoot E-6 at 10,000 E.I.	44
Slides to negatives at record speed—by Bill Hurter	
How to Make a Three-Minute Movie with One Roll of Film	53
Filmmakers' Workshop, Part VII—by Markene Kruse-Smith	
Low-Light Color Photography	60
A shot in the dark need not be a near miss—by Ed Becker	
Jennifer Griffiths: Sensuous Fashion	72
Portfolio	
Pyrotechnics	82
A new look at a venerable old developer—by John Wimberley	
Spec Sheet	93
Beaulieu 4008 ZM 4 Super 8 Movie and Rolleiflex SLX cameras	
Darkroom Water-Saving Tips	98
Don't let the drought get you down and out—by Parry C. Yob	
Blueprint	111
How to find a standard print developing time—by Walt Seng	

DEPARTMENTS

On the Scene	4
The Fruits of Plenty	
Guide Lines	10
In Dubious Service	
Self-Assignment	12
Double Vision	
In Just Seconds	16
The Fires of October	
Other Voices	17
Focus on Filmmaking	18
Polaroid's Instant Movies	
Far East Journal	20
First Stop—Quality Control	

Tools of the Trade	22
Exposing Memory to the Light of Knowledge	
Point Source	33
Lots of Waves, but No Beach	
Vintage Viewfinder	34
Making Big 'Uns from Little 'Uns	
Product Proof Sheet	37
Where the Action Is	38
Update: How Much to Charge	
Gallery '77	88
Seminars & Workshops Calendar	116
Camera on Campus	118
On Being Soft-Boiled about Eggheads	
Advertising Index	126
One to One	128
Darkroom Illumination	

COVER

Photo of David Bowie by Jacqueline Marsall is an excellent example of low-light photography. Shot taken with Pentax Spotmatic and 105mm SMCT lens on Kodak Ektachrome 200 Professional Film for 1/15 at f/3.5. Contributing Editor Ed Becker gives all pertinent information on low-light shooting in "Low-Light Color Photography," beginning on page 53.



PAGE 44



PAGE 60



PAGE 72



PAGE 82



PAGE 88



Hiro took these photographs with a Minolta and five leading 35mm SLR's that cost more. He found no difference in picture quality.



1.



2.



3.



4.



5.



6.



If you judge a camera by how good a picture it takes, how do you judge the pictures?

We know of no better way than to ask some of the leading photographers of our time.

Like Hiro. You can see exquisite photographic judgment in every Hiro shot.

So we asked Hiro to take the pictures you see here with a Minolta SR-T 201 and five other 35mm SLR's costing up to several hundred dollars more. And tell us which took the best picture. When he found no difference in quality, he confirmed what we're saying: No 35mm SLR at any price takes a better picture than a Minolta.

Now here's the most important conclusion of all: If no 35mm SLR takes a better picture than a Minolta, then there's no need to spend more. Espe-

cially now that Minolta 35mm SLR prices are lower than they've ever been.

Minolta SR-T cameras have satisfied more than three million owners. All have match-needle exposure adjustment, shutter speeds to 1/1000th of a second and Minolta's traditional human engineering for fast, effortless handling. Multiple exposure capability, built-in hot shoe, self-timer, memo holder and film safe load signal are among the feature choices available in SR-T models.

Electronic Minoltas have smooth, quiet shutters that automatically adjust speeds up to the instant you shoot for

unparalleled exposure accuracy. Three models let you select from a host of creative and convenience features such as interchangeable finders and focusing screens, speeds to 1/2000th of a second, multiple exposure capability and built-in hot shoe.

They all have patented Minolta CLC through-the-lens metering. Big, bright viewfinders with the information you need to compose, focus, and set exposure without ever taking your eye off your subject.

And all accept the nearly 40 Minolta Rokkor-X and Celtic lenses, plus more than a hundred other Minolta accessories.

Hiro used a Minolta SR-T 201 to take picture 5. If you'd like the names of all the cameras and which pictures they took, plus information on how the tests were conducted, write Minolta Corporation, Dept. A, 101 Williams Drive, Ramsey, N.J. 07446.



**No 35mm SLR at any price
takes a better picture
than a**

MINOLTA

ON the SCENE

the EDITORS

THE FRUITS OF PLENTY



BECKER



KRUSE-SMITH



HURTER



WIMBERLY



SENG



MARAH



GRIFFITHS

This month finds the proverbial October cornucopia replete with a veritable bumper crop of great new articles guaranteed to make the harvest season photographically bountiful . . .

The first of our savory fare is **Ed Becker's** "Low-Light Color Photography," in which our redoubtable contributing editor discusses shooting techniques for fast color films—including dim-light focusing, lenses, filters, f-stops and shutter speeds to keep you going even in the dark . . .

In "Make a Movie on Just One Roll of Film," Movie Editor **Markene Kruse-Smith** shows how to avoid the hassle of editing, save money and tighten up your camera technique all at once. The short, concise super 8 films that result are fascinating single-concept works . . .

Another ripe, juicy feature is "Shoot E-6 at 10,000 E.I.," by Editorial Assistant **Bill Hurter**. Spectacular color prints can be obtained by pushing Kodak Ektachrome 200 Professional Film in the C-41 development process. The technique is simple, materials are widely available, and you won't believe the results—a *must* for color darkroom workers . . .

Have you ever heard of pyrogallol? It just might be one of the finest black-and-white developing agents available for obtaining sharp prints with unobtrusive grain and a full range of tones, according to **John Wimberly**, author of "Pyrotechnics." To find out more about this classic developer turn to page 82 . . .

This month's "Blueprint" by **Walt Seng** tells how to find a standard film developing time to suit your enlarger, paper, method and materials and to get better zone values . . .

All of these darkroom articles might suggest that we've forgotten about the draught. Not so! With a dry spell plaguing much of the country this year and water rationing programs in effect in many places, **Parry C. Yob's** "Darkroom Water-Saving Tips" provides some welcome ideas for conserving this valuable resource without curtailing your photographic endeavors. Included is a chemical test to determine the efficiency of any print washing system . . .

This month we're happy to introduce our new Far East Correspondent, **Charles Marah**, whose monthly column, "Far East Journal," will keep us posted on goings on in the camera industry in Japan . . .

The featured portfolio this issue is by **Jennifer Griffiths**, a very talented photographer who specializes in portraits and fashion. We find her work vibrant, seductive and exciting . . .

COMING NEXT MONTH:

EASY PASSPORT TO PORTRAITS—Help your subjects sparkle.

HOW TO EXPOSE COLOR SLIDES ON THE NOSE—First time, every time.

BLACK-AND-WHITE OR COLOR—Which works best when?

PLUS:

EXPLORING INFRARED—Use invisible rays to change your world.

And much, much more!

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For less than twenty bucks, see how easy it is.



You've been waiting to try Cibachrome for a long time now. If only a sample size would appear someday, you thought.

Race down to your photo dealer! The Cibachrome Discovery Kit is here! Get everything you need to make 20 four-by-five prints directly from your slides: 20 sheets of Cibachrome print material, the 3-part chemistry, a filter set, the pro-

cessing drum, and a 16-page instruction booklet.

You've heard all about that brilliant Cibachrome quality. Now see it for yourself. Crisp, saturated colors. Rich, depth-revealing blacks. All achieved by an amazingly simple 12-minute, three-step chemistry with wide over-and-under temperature latitude.

It only takes one Discovery Kit to see how easy color printing with

Cibachrome really is. Then you're ready to start rolling bigger drums, pulling out bigger Cibachrome prints, up to 16 x 20 in size.

Pick up a Cibachrome Discovery Kit now for your favorite slides. Less than twenty bucks buys a lot of knowledge, and a lot of fun.

ILFORD

Ilford Inc., Paramus, N.J., 07652

The Cibachrome Discovery Kit. Four by five for starters.

and became the new standard of comparison in 35mm SLR cameras.

When the Olympus OM-1 was introduced five years ago in the U.S.A., some people laughed and called it a toy, because it was only two thirds the size of a conventional 35mm SLR. But the manufacturers of the most advanced 35mm cameras didn't laugh. They understood the implications. They went back to their design departments and got busy on their own compact 35mm SLRs.

The experts in the photo

magazines also took Olympus very seriously.

And professionals began replacing their traditional cameras with Olympus.

Soon the Olympus OM-1 became the new standard of comparison for compact SLR cameras.

And now, every time a new compact SLR is introduced, it's measured with an Olympus yardstick.

Measured against these five compelling ideas from Olympus.

1. A true compact size

Is it a true compact like Olympus, only 2/3 the size of

How a small camera captured a big country...



conventional 35mm SLRs? Some of the new "compact" cameras aren't.

2. Big, bright viewfinder

Is the viewfinder big and bright like Olympus, even though the camera is small?

3. Rugged beyond its size

Is it rugged and reliable like Olympus or was durability compromised for the sake of size and weight reduction?

4. A true 35mm SLR system

Is it just a camera or part of a system like Olympus? Does it have interchangeable focusing screens, sequential

motor drive to five frames-per-second, compact lenses from fisheye to super-telephoto, and all the other accessories pros and serious amateurs need?

5. Tested in the field

Has it been tested in the field for five years like Olympus?

Honest answers to those questions explain why Olympus is still the trendsetting compact 35mm SLR. And now there's the OM-2, the automatic exposure control Olympus that's the same size as the OM-1 and only 10 grams (approx. .353 oz.) more in weight. It has the

world's most advanced automatic metering system, the only one that measures light reflected from the film surface itself during exposure. No one laughed when the OM-2 was introduced. They've learned their lesson.

And we've added an economical power winder for both the OM-1 and OM-2 that can fire off up to three frames-per-second, plus a new electronic flash unit that takes advantage of the OM-2s auto-exposure circuitry to provide full camera controlled automatic flash exposure.

So who's laughing now? Olympus system owners. Ask an Olympus dealer to show you the OM cameras and tell you about the five compelling ideas that have made Olympus the new standard of comparison in 35mm SLRs.

Better yet, ask an Olympus owner. He knows the answers.

THE OLYMPUS SYSTEM



**If you choose a career in photography,
be sure to choose The School of Modern Photography
for fast, easy, learn-by-doing training.**



From coast to coast and around the world our students offer positive proof of SMP superiority!

Not long ago, each of the people quoted on these pages had a dream of becoming a photographer, but each had his doubts. All had doubts about their own abilities.

They doubted learning photography at home. But then something happened that convinced them of the lifelong value of learning photography through SMP.

Today, they've completed their SMP programs and each has moved ahead in a rewarding life of photography. Each has achieved an important measure of success. Each can look back with satisfaction at having taken that step of enrolling. Read why. Perhaps their experiences will dispel your doubts, and lead you to a rewarding career decision.

Builds Confidence Quickly

"I used to lack confidence in my work and was very hesitant in taking on any jobs, but now I have complete confidence that I can handle any situation that may arise. If anyone wants to truly learn photography, I would be honored to recommend your school."

Douglas J. Henry—
Mississauga, Ontario, Canada

Easy, Step-By-Step

"I think that SMP has been a wonderful learning experience for me. Most of all, I now have the confidence and knowledge to do the work."

Jordan E. Battle—
Meridian, Miss.

Helpful, Personal, Practical

"I thought the SMP course was excellent and well presented. I was most impressed with the practical assignment side of the course. I gained a lot of confidence in my ability as a photographer by proving to myself I could do it through the practical assignments."

Dan Watts—
Dallas, Texas

Quality Instruction That Produces Results

"The instructors have been extremely fair in demanding at all times a very high standard for the submitted work assignments which have made me ever so confident to take and produce any type of photography with a professional touch. Thanks a million to all at SMP—A Wonderful Organization!"

Gordon W. B. Thomas—
San Juan, Trinidad, W.I.

Helps You Make Money—Even While Learning

"I have been able to turn my newly-acquired photography skills into part-time earnings. The \$400 I made as a student went into additional equipment. I found the SMP course an excellent one. It gave me the confidence I needed in my free lance work."

Larry L. Schaffer—
Ferdale, Wash.

Qualifies You For Jobs—Or Your Own Business

"I now operate my own photo business and have considerable work as a free lance photographer. I do weddings, parties, banquets, real estate, copying. It goes without saying that your course has made this possible. It has given me the confidence to attempt all kinds of jobs."

Joe Abbott—
Danbury, Conn.

Stresses Professionalism

"I feel that I have benefited from the course and have gained professionalism and self-confidence in my work."

Roy A. Dixon—
Richardson, Texas

And Adds Up To "The Best!"

"I attended two photo schools and discovered SMP to be far superior in constructive criticism. The course provided the guidance to achieve quality in my photography. My earnings from free lance assignments have far surpassed the cost of the course."

Ms. Sandra D. Howie—
Charlotte, N.C.

Let SMP show you the way to money-making professional confidence.



You begin with a certain interest in photography. Perhaps you've had some considerable experience, perhaps it's little more than curiosity. But at any rate, you have a feeling that deep down you have a talent that hasn't really been fully brought out.

What's lacking? How can you learn to express yourself in a fascinating art form, or to make money in an interesting career—or both?

You read through many advertisements like this one, and you learn that many professional photographers got their impetus, their confidence, motivation and technical knowledge, by mail. These skilled professionals speak highly of the value of what they learned through SMP—The School of Modern Photography.

Learning By Doing

How did it happen? *They learned by doing.* Photography is the ideal subject to learn in this manner, with each photograph "its own thing."



Guided by experienced masters at the art of photography—who are also experienced licensed teachers—you move through carefully designed growth steps. At each step, your personal

instructor *shows*, by overlays and croppings, how your work can gain in professionalism, and he explains *why*.

Before long, terms like convergences and base lines are not abstract theory, but are second nature to you, because you've worked through them and you've learned by doing. And you've become adept with the equipment a professional uses.

You're A Professional

Now you move ahead even more rapidly because of your increased confidence, your enhanced motivation. You begin to tackle jobs that would have "buffaloed" you earlier. More than likely, you begin to make money even while learning. You are a photographer!

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THE SCHOOL OF MODERN PHOTOGRAPHY

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□ Most of you who read this monthly effort know that I'm an instrumentation addict. If it plugs into a wall socket or runs on a battery, I'll buy it—sometimes even if I don't need it. My darkroom is a jungle of wires and switches, a maze of instruments with blinking lights and assorted hums that makes it look and sound like an electronics outlet. Oh yes, I'm definitely hooked.

Of course, I could easily rationalize away my addiction to electronic instrumentation, but I won't go any further than to say I believe it makes my life easier. Anyhow, a few months ago a call from an old friend roused me from my summer lethargy. He had just purchased a Minolta 110 single-lens reflex and had just exposed a roll of Kodak Verichrome Pan Film. He needed some assistance in processing his first roll of black-and-white film and wanted to know which developer to use. I suggested he use Kodak's Microdol-X and went even further when I volunteered to come over to lend a hand.

Later, in his darkroom, we loaded his film tank with the exposed Verichrome Pan film and proceeded to dilute the Microdol-X 1:3. We processed the film for 9½ minutes at 75° F., and as I expected, the tiny negatives were excellent. They were full of fine detail and delicate gradation. We let the negatives dry.

Wishing him the best, I made ready to leave when he asked me to stick around and assist him in making his first enlargement from the tiny format. I agreed. We set up the various trays of developer, stop bath and fixer and proceeded to put the negatives into the enlarger, and that's when the trouble began. As I looked around his work area I noticed a definite lack of instrumentation. No enlarging meters—nothing. I was stunned. "How," I screamed, "am I to help you when you have absolutely no instrumentation?"

He hung his head and mumbled something about making test-strip exposures, as he always did when he made enlargements. "But that's time-consuming and expensive," I yelled. My palms began to sweat. Frantically, I searched my mind for something that I could do, some little trick that I had learned in the past. As I stared at the white light in the ceiling, I suddenly remembered something I used to do, way back, when even I (honest) had no instrumentation in the darkroom.

The white light was the answer, and it could be used with the light from the enlarger as a crude photometer. I placed one of the tiny negatives into the negative carrier and

Guide Lines

PAUL R. FARBER

IN DUBIOUS SERVICE



This is third print made from a roll of 110 negatives after a crude enlarging photometer was improvised into dubious service.

turned off the white light, leaving the enlarger turned on. Then I focused and composed the image on the easel as usual.

The next step was to insert a sheet of plain white paper into the easel and to turn on the white light in the darkroom. As I expected, the projected image could still be seen on the white paper in the easel. The next step was to simply close down the enlarging lens until the projected image just disappeared. I then checked the enlarging lens to see at what aperture the lens was set. It was nearly f/16, the end of the working apertures. This, obviously, was too small an aperture to use. The light from the overhead fixture was too dim. So I asked my friend to replace the lamp with a higher wattage bulb.

The effort here was to find a way to adjust the brightness of the bulb so that a working aperture on the enlarging lens could be realized. If the overhead lamp was too bright, then the projected image would fade out at too large an aperture, and if the overhead lamp was too dim, then the projected image would fade out at too small an aperture. Once I arrived at an aperture I felt was workable, the setup remained fixed. That is, the white light from the overhead lamp remained at the same distance from the enlarging easel.

The next step was to make an enlargement using the test-strip method my friend suggested. This was done, and the print was processed. The indicated exposure was in the 10- to 15-second range. Another print or two was made to find the optimum

exposure time, and it turned out to be exactly 12 seconds. I then wrote the number "12" on the box of paper we used.

At this point, my friend began to get interested. "What are you doing?" he queried. I explained that for the degree of enlargement we were using, and for the particular negative density and for the aperture that was determined by stopping down the lens with the room lights on (until the projected image just disappeared), an exposure time of 12 seconds had produced an excellent print. I went on to explain that if we increased the size of the enlargement or used another negative with a slightly different set of densities, the 12-second exposure time would have to change. This meant that another test strip would have to be made—and that was something I wanted to avoid.

Therefore, by maintaining the time of exposure at a constant 12 seconds, and by varying the lens aperture, I could compensate for different degrees of enlargement or different negative densities, provided that I used the same box of paper. Different boxes of paper of different contrast grades would require their own testing procedures to determine the optimum exposure times, and these could be written on the additional boxes.

And how was I going to compensate for the different degrees of enlargement or different negative densities? Easy! All I had to do was change the negative or the degree of enlargement and then turn on the white light overhead. At that moment I only had to readjust the lens aperture to the point where the projected image just disappeared and then to make the 12-second exposure. The print would be excellent.

I showed him how it all worked, and he began making prints. Practically each and every one of them was right on the money. As we were examining the finished prints, he burst into laughter. "You win!" he roared. I asked if that meant he was going to buy a modern analyzer.

"Hardly," he replied, and then proceeded to pull a highly sophisticated enlarging analyzer from under his worktable. "I use this all the time. I merely put it away after betting myself that you couldn't make a print without some type of instrument. Looks like I lost my bet."

"No," I groaned in total embarrassment, "if you stop to think about what happened, you'll realize that you won!" Whereupon I slunk out of his home and sulked away the remainder of the day. With friends like that, who needs enemies? □

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- The 211 is one of a complete system of 17 Sunpak electronic flash units, including three shoe-mount and two handle-mount models with Power Ratio Control.

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□ "Paint not what you see but what you know is there." Thus did Georges Braque, in conjunction with his friend Pablo Picasso, introduce a new imagery that was to revolutionize the world of art. Their dynamic visual concept came to be known as cubism, but the name is not descriptive and was, in fact, coined by the Parisian art critic Louis Vauxcelles, who ridiculed Braque's paintings by saying they looked as if they were made up of nothing but little cubes. Vauxcelles was not alone in his rejection of the work. The cubistic mode of painting shocked the traditionally conservative art world, and the critics were almost unanimous in their condemnation.

What was so shocking about cubism? Why did the critics and public vehemently reject it? Why were the cubist painters angrily accused of painting like "primitive barbarians"? The answer is simple. The cubistic paintings, when they were first introduced in 1908, violated almost every conventional standard of art. The paintings depicted a subject, not representationally as it would ordinarily be seen by the human eye, but as if it were being seen from a multitude of viewpoints (i.e., from above, below, behind, to the side and even from inside) at the same time. Their simultaneous presentation of multiple and different spatial aspects destroyed conventional perspective and defied a thousand years of traditional representational painting.

The concept was too new and affronted the critics, who rejected it in anger. Today, however, art historians consider cubism to be the most influential of all 20th-century art forms and credit it as being the source of all modern abstract art. (It is interesting to note that cubism, in turn, was actually based upon the intensely dynamic spatial abstractions found in primitive African art, which predated the cubistic movement by centuries.)

The cubistic method of visualizing an object is not only fascinating but is also excellently adapted to the medium of photography. The concept can be used to generate visual excitement in your own photographs. Remember, however, that cubism has very little to do with cubes. The early cubistic painters simply used a multiple, cubelike structural division to depict their basic idea of a *simultaneous presentation of multiple spatial viewpoints*. It is this visual conception, not the cubelike structure, that is important. Any image, cubelike or

SELF-assignment

BEN HELPRIN

DOUBLE VISION



This portrait, which presents subject's face and profile at same time, is cubistic in style. This month's "Where the Action Is" column also shows a cubistic portrait. Cubistic concept of simultaneous presentation of different visual aspects of same subject matter and how this concept can be used to generate pictorial excitement in your own photographs are discussed here. © Ben Helprin.

not, that shows different viewpoints of the same subject can be considered cubistic.

Photography is an ideal medium for cubistic purposes because of the ease with which multiple-exposure techniques (either in the camera during the original picture-taking session or in the darkroom during the printing procedure) can be used to present simultaneous viewpoints of the same subject matter. Thus, this month's self-assignment: *Create a photograph that presents subject matter in a cubistic manner.*

As previously mentioned, cubism in photography is best achieved through the use of multiple-exposure techniques. For instance, the cubistic portrait illustrating this month's article was made as follows:

1. The model was positioned approximately six feet in front of a white wall background. Two floodlights, placed slightly behind and to either side of the model, were used to evenly illuminate the background, and a "silhouette" exposure (deliberately thrown slightly out of focus to soften edges) was made of the unil-

luminated model's profile.

Note: Silhouette exposure was computed directly with an incident light meter positioned at the wall and pointed toward camera. The indicated exposure needed no adjustment. Had a reflected light meter reading been taken of the wall, however, the indicated exposure would have to have been adjusted by opening up $2\frac{1}{2}$ f-stops to render the background as white rather than as a mid-gray.

2. The model, who was wearing a black, turtle-neck sweater, was then positioned in front of an unilluminated black background, and her face was carefully lit. A second exposure was then made (on the same piece of film), which placed the model's face in the unexposed black area of the previous silhouette exposure.

An identical picture could have been made without the in-camera multiple exposure. The two exposures could have been recorded on separate pieces of film and then combined by sandwiching the negatives in the enlarger or by double-printing them separately on a single piece of enlarging paper. Any of these techniques (i.e., in-camera or in-enlarger multiple exposures or negative sandwiching) can be used to produce the same effect, and the choice of technique is determined by convenience rather than superiority.

Furthermore, the multiple exposures need not be made using black areas to separate the different views. The various images can be equally effective cubistically when they are fully lit and allowed to overlap each other. Nor do you need to limit the multiple imagery to only two views of an object. The number of images depends upon your interpretation of the subject matter, and you can combine as many exposures as you like.

Cubistic photographs can also be made without the use of multiple exposure or printing techniques. Simultaneous presentation can be accomplished in other ways. For instance, various photographs of the same subject matter can be cut up, and the pieces reassembled—in any juxtaposition you like—on a single piece of mounting board. As with all modes of art, it's the visual concept, not the technique employed to present it, that is most important.

Hopefully, your cubistic photograph won't incite the anger generated by the first cubistic paintings but, even if it does, the assignment should be fun for you. □

Enjoy the convenience of electronic flash with Kodak instant cameras. New Kodak instant flash units for Kodak instant cameras are here.

They plug into the flipflash socket on your Kodak instant camera. And use four AA-size batteries included. Take a shot, and you're ready for the next one in seconds. (A ready light lets you know exactly when.)

These hand-somely styled, self-quenching units control exposures automatically. They let you take flash pictures up to 12 feet from your subject. And they are color-corrected for Kodak PR10 film. A control on the

unit also gives you the opportunity to fine-tune the self-quenching circuitry for unusual subject or background lighting conditions.

If you have The Handle—Kodak instant camera, choose Kodak instant flash, model A. If you own a Kodak EK4 or EK6 instant camera, use the Kodak instant flash, model B, which has an added feature—the ability to take pleasing fill-in flash pictures outdoors. (If you don't yet own a

Kodak instant camera, look for our special Kodak EK6 instant camera kit, which includes the instant flash, model B.)

New Kodak instant flash units for yourself. For gifts. They're a nice way to make every instant count.



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The Handle—Kodak instant camera takes Kodak instant flash, model A.



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NIKON FM

*Introducing the Nikon high performance compact.
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Nikon engineers have succeeded in producing a compact without sacrifice of Nikons' standards of ruggedness, precision, capability and matchless quality. A camera smaller in price as well as size, with its own compact, economical motor drive. A companion to the professional's Nikon F2A, and a worthy addition to the ever-growing Nikon System. The new Nikon FM.

The FM is dramatically different from other compact cameras. Its distinction lies in a special kind of responsiveness which can only be called "the Nikon feel." You can literally perceive the extra measure of quality, precision. And, you will be astounded with the smoothness and quietness of this camera.

New Photo Diode meter system

A unique new gallium photo diode metering system with LED readouts in the finder gives the FM exceptionally quick response, accuracy and ease of operation.



Simply adjust either lens aperture or shutter speed until the center LED is illuminated. Unique circuitry assures bright and constant readout, even under the most difficult conditions. Using the proven Nikon center-weighted principle, metering will be accurate to within an incredible 1/5 of a stop. The range is equally impressive: EV 1-18, ASA settings 12-3200. In addition to the bright LED readouts, both shutter speed and lens aperture are displayed in the finder—the latter with a new direct-reading system that's utterly foolproof. Solid state circuitry results in an exceptionally durable, shock-resistant mechanism. The built-in viewing screen provides three-way focus control with split-image, microprism and overall ground glass. Add to this the brilliant clarity of the viewfinder itself, and everything you need to know about the picture is right before your eye, at all times. You can focus, meter and shoot with incomparable speed, ease, consistency and accuracy.

Everything you expect of a Nikon, and more

Extra features, special touches of quality have always distinguished a Nikon from any other camera. And, despite its compact size, you will find them in the FM. When you wind the film, for example, the lever requires only a single short stroke. The hinged, removable back has an oversize pressure plate and other facilities to keep film extraordinarily flat. The rugged metal focal plane shutter, with settings from 1/1000th to 1 second plus B, synchs with electronic flash at 1/125th to prevent



ghost images. Specifically designed for the FM, the shutter travels up, instead of down, in just 7 milliseconds. Combined with a unique braking system the result is noticeably less noise and vibration, as well as greater durability.

In step with today's trend to creative multiple exposure photographs, the FM is equipped with a special multiple exposure control, handily mounted on the top near the shutter release. With the MD-11 Motor Drive in place, you can even make multiple exposures at the rate of 3.5 per second!

A motor drive with Nikon capability at moderate cost!

In a design breakthrough comparable to the FM itself, Nikon introduces a totally new motor drive which you will be able to own at a fraction of traditional motor drive prices. The new MD-11, based on two decades of Nikon motor drive experience, can be used for automatic single frame advance, or as a regular motor drive at up to 3.5 frames per second. Either way, the motor-equipped FM camera is perfectly balanced, superbly responsive, a perfect definition of the meaning of "high performance" in camera design and technology.

The MD-11 motor drives uses eight AA batteries in an instantly interchangeable cartridge. With manganese alkaline batteries, it will easily fire up to 200 rolls of 36-exposure film. It can be attached

to any Nikon FM in seconds, without adaption. Naturally, there is a remote control terminal which allows you to trigger the camera with any of a wide array of electronic, electrical and mechanical devices available in the Nikon motor drive system, the most extensive and time-proven in photography.

New instant lens interchange with high-performance AI-Nikkors

Consistent with all new Nikon cameras, the FM has an important new automatic lens indexing system utilizing a new series of AI-Nikkor lenses. These lenses can be mounted for full-aperture metering without regard for the aperture setting, so that interchanging is even faster than before! This feature will be available on a full range of Auto-Nikkor lenses, 6mm through 600mm, and complemented by the full array of non-meter-coupled Nikkors though 2000mm, all of which fit the new cameras. (Non-AI Auto-Nikkors are used on the FM with stop-down metering or, in most cases, can be modified inexpensively for AI operation. If interested, write for Lit/Pak N-27.) Of course, a wide variety of other Nikon System accessories work perfectly with the FM.

Words alone cannot convey the phenomenon which is the Nikon FM. It is a camera you must hold and operate to fully appreciate its perfect size and weight, the superlative balance, the inimitable feel of precision. And most especially its extraordinary responsiveness when equipped with a motor drive. The Nikon FM will be available beginning in July.

Nikon Information: For details on the Nikon FM, check the Yellow Pages for the Nikon dealer nearest you, or write for Lit/Pak N-37. Also, ask about the new two-course traveling Nikon School of Photography. And in New York City, visit the new Nikon House at Rockefeller Center.

Nikon Inc., Garden City, N.Y. 11530.
Subsidiary of Ehrenreich Photo-Optical Industries, Inc.
EPOI (In Canada: Anglophoto Ltd. P.Q.)



©Nikon Inc., 1977

□ There are demons in the hills—nasty little things with glinting eyes and teeth like glass shards. Should you meet up with one during some autumnal woodland stroll, you'll have only one chance to come out of it with all your vital juices intact. And that is to present the little devil with an instant portrait of itself. Needless to say, it had better be a flattering likeness.

October light is beautiful. It defines subjects gently but with surgical precision. The earth is rich with harvest colors, the air clean and invigorating. Leaves of glossy, kiln-fired red and yellow glide on the wind like manta rays. The moon is the color of cider. This time of year never fails to excite me, to make me feel caught up in the rhythm of the earth. I'd sooner go outside in October without my shoes than leave my camera behind.

Back in the days when cameras were usually more complex than a Victor rattrap but simpler than a Mickey Mouse wristwatch, I wandered happy as a sprite through the autumn wood with a Kodak Instamatic 100. The pockets of my tweedy jacket were filled with boxes of Kodak Kodacolor Film and AG-1B flashbulbs. To many my camera with its fixed aperture and shutter speed would have seemed far too limiting for creative work. But I had one extraordinary bit of luck—I had no sophisticated photographer friends around to tell me what I could not do with my simple camera. Nobody told me that I couldn't make photographs on heavily overcast days. Nobody advised me against photographing trees through champagne glasses or attempting to photograph fast-moving subjects.

True, I lost a few frames through my experimentations, but more often than not, the results I obtained astounded the staff at the local camera shop where I took the film to be processed. A bed of leaves shot close-up and at ground level looked like a stream of fire. A slightly underexposed dawn shot yielded a beautiful and delicate print. A field photographed through a sheet of yellow acetate had a soft, impressionistic sensuousness. All this from an inexpensive little camera whose shutter was too simple, whose lens was too slow.

Remembering just how much fun that early discovery of photography was for me, I'd like to encourage you to give that adventure to someone you like, young or old, by presenting him/her with a Polaroid OneStep or Kodak Handle. Technological advances and competition have created a very happy situation for the con-

IN JUST SECONDS

JOE NOVAK

THE FIRES OF OCTOBER



Whatever it is, I had to promise to send it a print, or I never would have gotten out of there.

sumer. Listing for under \$40, these cameras represent extraordinary values. Each has a fixed-focus lens that will deliver sharp images at distances between four feet and infinity, but that is where the similarity to the old-fashioned box camera ends. Both cameras feature sophisticated electronic exposure systems with lighten/darken controls and exceptionally bright, comfortable viewfinders.

Of course, the real advantage these cameras offer is the joy of being able to see the result within minutes of making an exposure. This is valuable to all of us, no matter what degree of experience we possess. Apart from the obvious value of an instant print in directing and reinforcing our vision, this kind of photography has another, more fundamental advantage. Shortly after I began using an SX-70 camera, I had to leave town for a few days on business. I wasn't pleased about this because it meant leaving my new girlfriend. After waving to her sadly from the window of the moving train, I looked down at the pictures I had taken of her moments earlier. She was returning in the images right before my eyes. At that moment I knew I had fallen hopelessly in love—with both my Polaroid SX-70 camera and Holly. It was that experience more than any other I can recall that sold me on instant photography.

It is because of this spontaneity, this wonderful capacity of the process not to merely record an experience but to heighten it, that I won't be without my SX-70 camera this fall. It makes me reexperience some of the happiness I felt when I started photographing.

Those who love to photograph the little things in life will find the SX-70 camera to be ideal. Without accesso-

ries it will focus as close as 10.4 inches, perfect for a head shot of a crazed jack-o'-lantern or a spreading bat. With the addition of a simple close-up lens you can even make life-size photographs of nuts and berries if these happen to turn you on.

When making such extreme close-ups, the use of a FlashBar is sometimes advisable, even though there may be sufficient natural light for a handheld exposure. The strong illumination provided by the flash will insure that the lens will be stopped far down, resulting in greater depth of field. Carrying a full-size tripod would spoil all the fun, but it's a good idea to take along a tabletop tripod with a ball-and-socket head. That way, you won't make the camera tremble as you bring the red hourglass on the belly of a black widow into focus.

Always carry a FlashBar or Flip-Flash when you are photographing outdoors with your instant camera. Under many outdoor lighting conditions the use of flash provides a faster shutter speed and/or greater depth of field. In even moderately deep shade it can mean the difference between photographing at 1/15 and 1/40 second. Using flash simply insures a sharp image in borderline lighting situations.

Alpha, Pronto! and OneStep cameras offer the unique capability of automatic fill-flash. These cameras employ exposure control circuitry, which integrates natural and artificial lighting to create beautiful photographs under any condition. If the lighting is harsh and contrasty, the FlashBar can reduce the lighting ratio to one that can be recorded gracefully by the film. Conversely, when the day is so gloomy that your subjects look like gray sludge, the FlashBar can impart a sunny sparkle to your photographs. Colors come to life, and skin tones are rendered pleasingly.

Don't forget to make some photographs at dawn and at dusk. The colors of the landscape are soft and muted in the early light. It's so beautiful outdoors then that it won't matter a great deal if you should fail to come up with any photographs—you'll feel great just being there. At dusk that cider moon will grow in intensity as the aroma of burning leaves fills the air. You'll delight in the cheerful crackle of leaves and twigs under your feet. And just maybe—as the gloom rapidly descends in the lonely hollow—your heart will quicken to the sound of distant hoofbeats, and you'll see a great black horse breathing blue flame, and atop the horse . . . □

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FAN—PAST, PRESENT AND FUTURE

Obviously, I enjoy and approve of PhotoGraphic; otherwise, I wouldn't have just renewed my subscription for a two-year period. I am pleased that you seem to have fewer ads (and what is advertised comes from the most respected sources) than many of your competitors, in spite of the expense of putting out a magazine—no doubt you could obtain many more.

As a retired (what a misnomer!) professional, I cannot see the reason why so many other publications publish so many long and involved articles on the innards of the latest electronic cameras, lens tests, shutters, ad nauseum. "Spec Sheet" does the job adequately and simply.

I enjoy all of the columnists (even when their egos show through); many times they say things that really get me thinking about new ideas.

Thanks again for providing me with many hours of photographic reading pleasure.

Art Reed
Tappahannock, Virginia

STUCK WITH SIMPLICITY

I was most interested in your editorial response to Mr. Mayer's letter in the August, 1977 "Other Voices" (see "Appalled or Appeased?"), which discussed the possibilities of mixing dry chemicals in smaller-than-called-for quantities. I have been doing just this for years with no bad experiences yet.

For films I use a 1:3 solution of Microdol-X; to obtain this I mix 10ml powder to one pint water. This gives me just enough developer to process one roll of film. For papers, I use a 1:2 solution of Dektol, mixed 20ml powder to one pint water.

I buy foil packets and, after each mixing, tightly seal them to avoid air contamination. By doing this, a packet of chemicals lasts almost forever. As I've already mentioned, I've used this method for over two years and have yet to regret it. I'm not a chemist, and maybe someone will say I shouldn't be doing this; however, I'll stick with this method until I'm proved wrong!

John Proctor
Scottsboro, Alabama

FRIENDS FOR SALE

There comes a time in everyone's life when it is necessary to say goodbye to old friends. My "old friends"

include my voluminous collection of back issues of PhotoGraphic. If any readers would care to acquire this collection, I would be pleased to hear from you.

M. Waktiendienk
7225 E. Prairie Road
Lincolnwood, Illinois 60645

SOMETHING FOR EVERYONE

The article, "Sunshine in Your Camera," in the June, 1977 issue was intriguing and shed—if you will pardon the prose—a new light on natural backlighting. I do want to bring to readers' attention, though, another safety warning not mentioned by the authors.

Eye exposure was mentioned with an appropriate warning as was the effect of shooting into the sun on CdS metering systems. However, what was not mentioned was the fact that if one is using a nonreflex, focal-plane shutter camera or is using the mirror lock-up, the sun can bore a neat hole in the shutter curtain in no time. I would hate to think that some poor soul with a Leica would discover, when the processed film came back from the lab, that the shutter curtain had been neatly ventilated. By the way, I have seen this happen back in the days of the Leica IIIc.

Actually, the main reason for my purchasing the June, 1977 issue was for the article "E-6," and I was definitely not disappointed with the information provided. I also got a chuckle out of "Guide Lines," which discussed developers (I'm a chemist by profession and an old champion No. 15 man). Does anyone still make color prints by multiple masking and toning of black-and-whites? I do (speaking of alchemy!)

By the way, thank you for showing readers a cover girl who is neither a blue-eyed blonde nor a green-eyed redhead—brunettes are best!

Robert S. Rabinowitz
Norwich, New York

IMPOSSIBLE SETUP

I wonder if anyone studied the equipment photo directly underneath the heading, "Teleconverters—Are They Worth Using?" by Ed Becker in the July, 1977 issue? If they did, they would notice that an attempt at the impossible was illustrated. There is no way that a Komura or any other brand converter in a Canon FD mount can be reversed to fit a Nikon camera. The unknown lens in front of the converter can't be fitted either.

Don't feel bad, though, I know where the photo originated—it came from the importer of said converter!

Gerald Jenny
New Orleans, Louisiana

(Continued on page 26)

Beseler PM2L Color Analyzer



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□ Polaroid Corporation is beginning to market their new motion picture system that allows a movie to be viewed almost immediately after it is filmed. Models will be available in limited quantities this fall, with full-scale manufacturing and sales really getting under way next year. The revolutionary new photographic system, called Polavision, comprises just three elements—a compact, handheld camera, cassettes holding two minutes and 40 seconds of a new kind of color film and a self-contained, portable player on which the movies are viewed.

To make an "instant movie" you simply drop a film cassette into the camera, then aim and shoot. When the film has been exposed, the cassette is inserted in a slot in the top of the player. In approximately 90 seconds the movie, having been instantly processed within the cassette, appears on the player's 12-inch screen.

Polavision eliminates the hassles of conventional home movies. There's no need to wait for an exposed reel to come back from the developing lab, no setting up a projector and screen, no threading film, dimming lights or cajoling a television-glued audience of friends and family to watch to make the effort worthwhile. Finally, you don't have to take down all the paraphernalia when the films are finished—the player remains on a table or bookshelf, like a TV set. The system is perfect for the many thousands of people who don't consider themselves filmmakers or even home moviemakers, but who would like to have a series of moving picture "snapshots" to document personal events. A cassette library of unedited family highlights might include baby's first step, Harry's birthday, the dog's new tricks and the kids on Halloween. The vignettes are immediately ready for viewing with no threading or spooling of the film. The images are rear-projected color pictures shown in a fully lit room, television style. What could be simpler?

Dr. Edwin H. Land, chairman of the board and director of research at Polaroid, suggests that the ease of playing the cassettes will allow extended viewing with the selections precisely tailored to the occasion. "The new system obsoletes the current necessity of stringing short films together in long reels," Dr. Land says, "and, furthermore, you are not locked into looking at a long reel when you really want to see just a portion of it."

The film cassette looks more like a Fuji single 8 film container than it resembles the Kodak-type super 8 film cartridges. It is about 5½ inches by

FOCUS on Filmmaking

MARKENE KRUSE-SMITH

POLAROID'S INSTANT MOVIES



These are the three components for Polaroid's new instant movie system—a Polavision Land camera, self-developing film cartridge and viewer/player.

2¾ inches by ½ inch in size and simply drops into the camera. The cartridge will not fit into any movie camera but the Polaroid model.

All film movements and chemical developing take place entirely within the cassette and are invisible to the photographer. During exposure in the camera, the film moves between supply and take-up spools past an aperture midway down the cassette's long, narrow side, where it is exposed by light from the camera lens. The film is advanced by a claw, which enters the perforations at the cassette aperture.

The film never leaves the cassette. When the cassette is inserted into the player, the film inside it is developed while it rewinds onto the supply spool within the cassette. After development and rewind, which lasts a minute and a half, the film is projected on the player screen, then is re-wound within the cassette to be ready for playing again.

The Polavision camera runs at 18 frames per second only, with a reflex (through-the-lens) viewfinder and an automatic exposure meter that cannot be manually overridden. This first model does not record sound, although the silent film cassette does carry magnetic striped film. The camera has a 12.5 to 25mm (2:1) zoom with an f/1.8 lens, and close and far focusing ranges. Viewfinder images are bright and sharp. The exposure meter is adjacent to the lens, viewed through the upper part of the cam-

era. Four type-AA penlight batteries located in the pistol grip provide the power. The camera has a built-in type A filter, like most super 8 cameras, and there's a plug for a movie light on top of the body and a tiny footage counter at the side.

Although the film in the cassette is super 8, it's not intended to be projected on anything but the Polavision player. It's possible that the processed film is too dense to be projected with an ordinary super 8 projector. A 150-watt lamp illuminates film in the Polaroid player. When viewed in the player, the projected images are very bright and somewhat contrasty with good color saturation, fair resolution and a grainy texture. The pictures are very sharp when watched at normal television viewing distance. Right now there is only one film stock available—an indoor/outdoor film with an ASA of 40 with tungsten light, 25 with the daylight filter outdoors (like Kodak's Kodachrome 40). The film in the Polavision cassette is 43 feet long instead of the usual 50 feet per super 8 film cartridge.

Since the film is magnetically sound striped, movies shot in a silent camera will not have to be sent to a lab for striping if you want to add music, narration or sound effects. Provisions for direct sound recording in the camera and possibly for recording sound later with the viewer are likely to be added to future models. List price for the Polavision camera/viewer combination is expected to be about \$500.

At this time, there's no way to edit the Polavision movies, although there's a button at the back of the viewer that will stop the film at a specified frame, perhaps for editing purposes. Film could probably be marked, removed from the cassette and wound on reels if you could get the film out (and back into the cassette again after you've made the splices) without damaging cassette or film.

Until it becomes possible to edit Polavision film, though, we've come up with one creative alternative that seems ideally suited to instant moviemaking—make a movie on one roll (cassette or cartridge, depending on your preference) of film. For more information please turn to page 52 of this issue. In the meantime, a toast to Dr. Land and Polaroid! They have opened up whole new possibilities for artists and imagemakers as well as doing what they set out to accomplish—enabling people to record their worlds in moving pictures, simply, efficiently and with instant playback. □

Most photographers move up to the **OMEGA SYSTEM 66.** Smart ones start with it.



After all, the Omega B66 is a totally modular dark-room system—for all negatives to 2¼ square—color and black and white. It's a system that lets you *custom-design* your own enlarger—from a starting choice of 24 different enlarger/lamphouse/lens kit combinations.

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□ Back in bustling Tokyo after a much-needed respite in relaxed Manila, I was pleasantly surprised to find Paul Farber here—even more so when I learned that the job of Far Eastern Correspondent for Photo-Graphic Magazine was mine if I wanted it. I wanted it! After settling details over morning coffee at Paul's hotel, we parted, and I set off to prepare for my new assignment.

Some time was spent settling on a name for the column that hopefully would somehow convey the feeling of "orient" and current photo topics, after which, the first problem was where to start. Which of the legion of manufacturers, purveyors and consumers of cameras, lenses and other photographic paraphernalia was I to visit first? I decided to start gradually with a quick review of quality control in the Japanese camera industry and a brief report on a fantastic camera collection.

A phone call got me an appointment with Mr. Akiyama, executive director of Japan Camera Industry Association and Mr. Suzuki of the Foreign Department. The gist of our conversation was that JCIA was formed by the Japanese camera manufacturers to perform a sort of self-policing function in order to maintain consistently high quality standards for the good of the industry as a whole. Second-rate manufacturers have been effectively eliminated because those not meeting minimum standards are not allowed to export—the direct approach.

To get more details, my next visit was to Japan Camera and Optical Instruments Inspection and Testing Institute (JCII). Here I met Executive Director, Mr. Yatomi, and Mr. Hibi, manager of the Type-Test Department and custodian of the JCII camera collection. Mr. Yatomi explained that there were only eight JCII employees at the beginning, but that they now number 120. And 70 of these are fully qualified engineers. Although JCII was established by the Japanese government, it is completely independent and is supported solely by inspection and test fees.

In the somewhat plain but ample JCII building photographic equipment of all types undergoes a severe battery of tests. Let's take a look inside and see what goes on when a camera is tested. Each camera model must first of all undergo a type-test at least twice a year. Samples are selected at random by an inspector. The f-number and focal length of the lens are checked; the finder field of view is measured, and then, if all is well, the torture treatment starts.

In one test the camera is repeated-

FOR EAST JOURNAL

BY CHARLES MARSH

FIRST STOP— QUALITY CONTROL



Mr. Hibi, manager of the Type-Test Department and custodian of the JCII camera collection.

ly operated hundreds of times to check for failure. This is followed by a shock resistance test, vibration resistance test, high and low temperature tests and others to assess durability and reliability. Once a camera passes the type-test, it is eligible for the lot inspection. Here 16 different points are checked, including appearance, light leakage, lens resolution, exposure time, etc. Only if the camera satisfactorily passes all of these tests is it qualified to proudly wear the familiar gold "Inspected JCII" label.

To mention only one of the many testing machines I saw, and one that JCII is especially proud of, is its OTF (optical transfer function) measuring instrument. OTF is considered by many the very best way of evaluating lenses. And this one, designed exclusively for 35mm camera lenses from 20mm to 200mm focal lengths, is so accurate that it is regarded as the standard testing instrument in Japan.

While it is admittedly difficult to convincingly convey the impression with the printed word, I have a fresh appreciation of the real efforts being made by the Japanese camera industry to produce the finest, most advanced equipment possible.

On a second visit to JCII, Mr. Hibi took time out from his busy schedule

to guide me through the historical camera collection. I guesstimated the camera population at about 800—and every one of these cameras is unique in some respect! The purpose of the collection is to be a reference source for researchers. Cameras embodying every conceivable mechanism or function are housed here. And the uniqueness of each exhibit makes it difficult to describe the entire collection satisfactorily here. The best way seems to be to mention a few of the cameras that caught my eye.

The awkward-looking object held by Mr. Hibi in the accompanying photo is the first Japanese camera with fisheye lens. Nikon developed it in 1957 for use by government agencies in making cloud observations. The f/8, 16.3mm lens produces 12 round negatives on a roll of 120 film. There are four built-in filters and a built-in intervalometer that allows automatic operation at intervals of from five to 180 minutes.

Meisupi and Meika are the names of two through-the-lens reflexes that have their lenses arranged horizontally instead of in the normal vertical format. Togodo introduced the Meisupi in 1937 with f/4.5, f/5.6 and f/6.3 lenses of 50mm focal length. Film was in 3×4cm sheets. The shutter provided speeds of T, B, 1/25, 1/50 and 1/100. Meikai, on sale in 1940, was a 35mm camera with a choice of four lenses: f/6.8, f/6.3, f/4.5 and f/3.5. Shutter speeds were T, B, 1/5 to 1/200. The price with the f/3.5 lens was 88 yen.

Names, especially among the pre-war models, were sometimes amusing. For example, Minimum Idea, Idea Spring, Semi-First, Super Semi-Proud, Guzzi (pronounced "Gutsy") and Mammy! Can you imagine a photographer telling a prospective subject to wait while he goes to fetch his Mammy?

If there is sufficient reader interest, in future columns I could periodically give data on some of the more interesting cameras from this collection, especially the prewar models, which are relatively unknown.

Of course, this brief survey doesn't tell you about the hundreds of other interesting and innovative cameras in the JCII collection. It doesn't tell of the years of research and development that went into them. Nor does the short introduction to JCIA and JCII tell you fully of the continuing efforts of the Japanese camera industry to bring more innovations in the future. But if I told you everything in this first column, there wouldn't be need for others, would there? Sayonara until next month! □

On Photographing the Invisible

To the naked eye, it was a Swedish 80-öre postage stamp. A rarity, and very valuable.

The camera, however, told quite another story. The stamp was a counterfeit.

Faint traces of tampering that were hidden to the naked eye were revealed by the camera. Someone, somewhere, had ingeniously altered the stamp by chemically removing a surprint. The stamp was worthless.



To the naked eye (left), the stamp was genuine. To the camera (right), it was a counterfeit. Note the faint, dark traces of tampering now revealed in the upper section.

What manner of exotic camera was this that could "see" the invisible?

The lens: one of the 20 in the Hasselblad arsenal, the 105mm Zeiss UV-Sonnar f4.3. Designed for photography within the ultraviolet portion of the electromagnetic spectrum, its costly quartz elements can detect radiations that are unseeable by the human eye.

It has peered at objects in outer space, examined forgeries, laid bare the secrets of counterfeit money. Not a lens for everyone, obviously, but an indication of just how awesomely comprehensive the Hasselblad System is.

The camera: an otherwise perfectly standard Hasselblad 500C/M,

normally fitted with an 80mm Zeiss Planar f2.8 multi-coated lens.

This is the basic model that allows you to tap into the vast Hasselblad System. It is one of the most bewilderingly versatile cameras the world has ever known. Yet so marvelously simple to operate that it often plays the part of the family snapshot camera.

A True System.

The Hasselblad System is a prodigious array of 4 cameras, 20 lenses, 8 viewfinders, 9 film magazines, and over 300 other accessories. Choose the right pieces, and your 500C/M would be equipped for sports, aerial, architectural, and fashion photography.

And portrait, landscape, medical, underwater, and news photography.

And wildlife, laboratory, industrial, and child photography.

And you would always have the right film in the camera at the right time. You can shift from color to black-and-white and back again to color—and resume shooting at precisely the right frame—by popping in the protective dark slide and switching film backs.

The Camera with Nine Backs.

There is a small button on the film back of every Hasselblad 500C/M. Slide it sideways with your thumb and the back will come away in your hand.

The standard back holds 12 exposures. Each frame of film is $2\frac{1}{4}$ inches square, *almost four times the area of a 35mm frame.* (See box, below right, for actual size.)

This is only the beginning. There are eight other backs available: Backs that let you change to a 6 x 4.5cm format...or a 4.5 x 4.5cm superslide format for showing in any 35mm projector. Backs that give you a choice of 1, 12, 16, 24, 70, or 500 exposures. A back that is a sheet-film adapter.

Even two backs for Polaroid film, so you can check composition, lighting, and exposure ahead of time.

You begin to realize why eight out of ten top commercial photographers surveyed name Hasselblad as the medium-format camera used in their work.

Retained Value vs. Obsolescence.

In an age when machines spew out cameras in the tens and hundreds of thousands, when flashy new models thrust last year's marvels into early obsolescence, Hasselblad goes its own way.

Planned obsolescence is taboo at Hasselblad. All but two of the accessories for the 500C/M will fit every Hasselblad made since 1957 (except the Super Wide C)...and will fit every future Hasselblad.

The greater part of a year is spent on building each camera, much of it crafted by hand. And fully one quarter of the work force devotes its time to nothing but quality control.

Little wonder, then, that a pre-owned Hasselblad commands such a high price...if its owner can be persuaded to part with it at all.

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□ My memory isn't exactly bad, but every once in awhile the circuits seem to get a bit overloaded. Take the subject of light sensors, for instance. Not too long ago all I needed to remember was selenium and cadmium sulfide—easy enough. Then came silicon cells and silicon blue cells. Still not bad—my memory could handle that without much trouble.

In the past several months, however, my memory has threatened to blow a fuse. For example, I have recently encountered camera specifications designating a GaAsP cell (I did exactly that!). So I have found that ignorance is definitely not bliss.

As strange as it may seem, learning *more* seems to make remembering easier instead of more difficult for me. I have decided that perhaps understanding is the key to this phenomenon. So the time for action had arrived. I set out to learn more about all photocells.

I discovered that before the days of light sensing equipment correct exposure was totally a matter of memory—the photographer had to remember what exposure worked correctly when last he shot under similar weather or lighting conditions. The earliest type of meter was called an actinometer. This device utilized a piece of sensitive paper that darkened to a standard shade when exposed to light. The photographer measured elapsed time, then used a conversion chart to determine his film's correct exposure time.

With the advance of technology came electrical exposure cells. All light-sensing units today are electrical in nature and are one of two types, depending on how they react to light. A cell that generates electrical current (voltage) when light falls on it is called *photovoltaic*. The greater the light intensity, the more current it produces. Only photovoltaic cells can correctly be termed photo diodes. A cell that does not generate its own current but whose electrical resistance varies with the intensity of light is called *photoresistive*. In this second type of cell voltage is supplied by a battery and then measured; resistance is high in dim light and low in bright light.

Each different kind of cell has a characteristic spectral response, i.e., reaction to various wavelengths (colors) of light. This reaction can be plotted on a graph and compared to the spectral response of the human eye. Wavelengths of blue light are comparatively short, and the wavelengths of red are long with green light falling in the middle. The spectral peak of human vision—the point at which the eye is most sensitive—is

TOOLS OF the TRADE

KAREN SUE GELLER

EXPOSING MEMORY TO THE LIGHT OF KNOWLEDGE



What do each of these diverse pieces of photo gear have in common? Clockwise from top left: Wein WP1000 flash meter, Vivitar SL-2 slave, Vivitar 272 Auto thyristor flash, Sekonic L-428 light meter, Minolta Pocket Autopak 70 camera and Nikon FM camera. Each uses a light-sensing device to do its job.

555 nanometers (a nanometer is one millionth of a millimeter) or in the area of green light. Ultraviolet rays fall below the visible spectrum, and infrared rays are above the visible spectrum.

It is advantageous to use light-sensing cells in cameras and exposure meters that respond in a manner similar to the human eye, since if their response were greatly different, the indicated exposures would appear incorrect on film. For example, if a cell were extremely sensitive to infrared rays, the exposure indicated would be one for adequate light even though there was none for the human eye to see, and the result would be an underexposed photo. Although this is an extreme example, the same general principle holds true for visible light as well, since daylight can be red, blue or yellow depending on locale and time of day.

There are other characteristics of light-sensing devices that are important to their use in photographic equipment. These include stability over a long period of time, consistency of response (does not vary from cell to cell), how they withstand the effects of humidity, the speed of their reaction time to light, the speed of their recovery (memory) and whether or not cell response is linear (i.e., changes in light intensity produce

equal changes in output). If a sensor is not stable, its readings will deteriorate over the life of the unit. If response was inconsistent from cell to cell, each piece of equipment would have to be calibrated individually, making manufacture expensive. If humidity affects its reaction, performance would be invalid in some climates, but accurate in others.

Faster-acting cells have made automatic cameras and flash units possible. If recovery time is slow, it may affect subsequent readings. Nonlinear response patterns give uneven needle deflections as light changes and require complex equipment designs to compensate. Needless to say, each of the various kinds of cells reacts differently to these many characteristics. There are, therefore, advantages and disadvantages to each light sensor.

Selenium—Historically the oldest in terms of photographic use, selenium is photovoltaic; its chemical symbol is Se. It has poor sensitivity in low light but has a spectral response about equal to the human eye. It deteriorates with the passage of time and is adversely affected by humidity. Selenium responds and recovers fairly quickly.

Cadmium sulfide—This cell is photoresistive; its chemical symbol is the old familiar CdS. It reacts faster than selenium, and it operates very well in low light levels. It suffers greatly from "memory," varies from cell to cell, and its spectral response is a poor match for the human eye.

Silicon—This very fast-acting, photovoltaic cell has a chemical symbol Si. It is excellent for automatic equipment and has little memory problem. Blue response is poor, and it is highly oversensitive to red and infrared; filtering significantly corrects these faults. Silicon has the advantage of an easy-to-work-with linear response.

Silicon blue—Designated SiB, this photo diode has a better spectral response than silicon; it, too, improves with filtering.

Gallium arsenide phosphide—The newest of cells carries the symbol GaAsP. It is insensitive to infrared wavelengths, which is good, and it has a linear response, which is also good. It has a good spectral response, although it is very weak in red sensitivity.

While there may be no universal truths to be learned here, no right or wrong of light-sensing cells, you should now be able to choose light-sensing equipment according to your anticipated needs. And now, having increased my knowledge of the topic, my memory no longer fails me. How about yours? □

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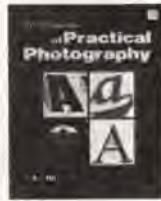
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14"	1.68	33"	3.96
15"	1.80	34"	4.08
16"	1.92	35"	4.20
17"	2.04	36"	4.32
18"	2.16	37"	4.44
19"	2.28	38"	4.56
20"	2.40	39"	4.68
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Colors SILVER, GOLD, BLACK

OTHER VOICES

(Continued from page 17)

ONE-STEP BORDER

Here is a variation on "How to Put a Black Border on Your Prints" (see June, 1977 issue) that I've been using for many years and which I feel is much easier than Mr. Kuehn's method.

Assume you are printing on 8×10-inch paper, picture size is 7½×9½ (¼-inch white borders all around). Print picture normally, then remove negative. Center a piece of black paper on card stock, cut to 7¼×9¼, over exposed paper in easel. Expose to white enlarger light for a few seconds to produce a black, ¼-inch wide border on all four sides of picture in one simple step.

Kenneth W. Hart

Thompstontown, Pennsylvania

SUCCESS WITH SABATTIER

With much enthusiasm I conducted the Sabattier Effect procedure by Scotty Ross as mentioned in "Self-Assignment" in the March, 1977 issue. This easy-to-follow method is fantastic! I've done at least six different negatives to be sure I was getting consistent results, and for the very first time in my 15 years of black-and-white work, I'm able to produce a Sabattier Effect on practically any print.

A number of points in the article are well worth extra emphasis: 1. Best results have been obtained with Agfa Brovira paper as opposed to Kodak papers. 2. When drying print before re-exposure, be sure all water has been removed from print. If this is not done, streaks will appear. I've found that developer from a previous print can also cause streaks; therefore, it is worthwhile to wash the squeegee thoroughly before using it on another print.

Thanks again to Mr. Helprin for sharing this technique with readers; I'll be sure to put it in my darkroom notebook for future reference.

William B. Ellis

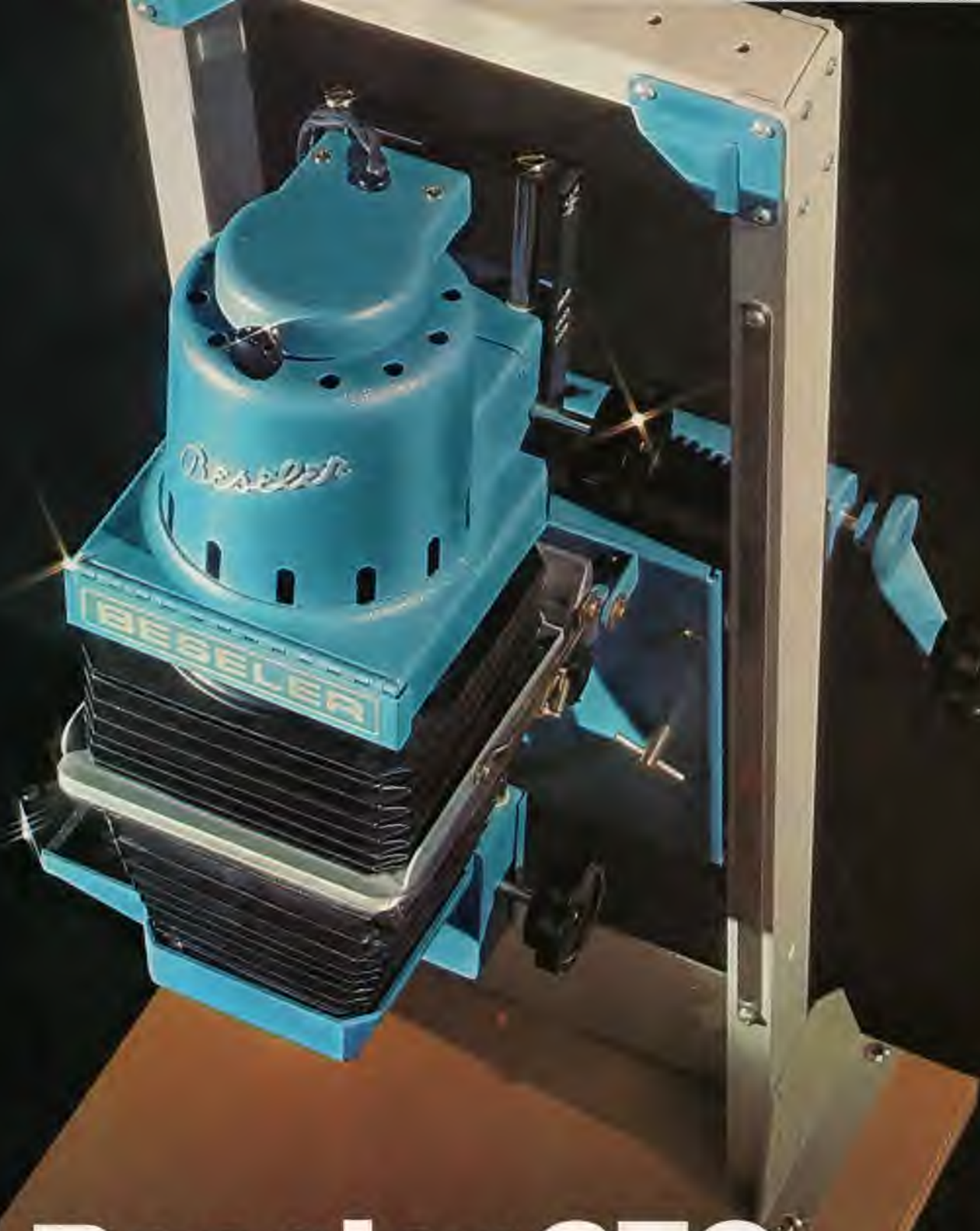
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EDITORIALLY SPEAKING

Perhaps it is because photography (and art in general) has attempted to emulate science in an age that is often overly preoccupied by facts and figures that we have been forced to create "photo theory," with its myriad sects, priests and zealots. All seem dedicated to the peculiar notion that there is only one "right way" to make photographs.

What seems forgotten is the fact that in art as well as science it is the revelation of the world within and without that is the goal of serious ef-

(Continued on page 114)



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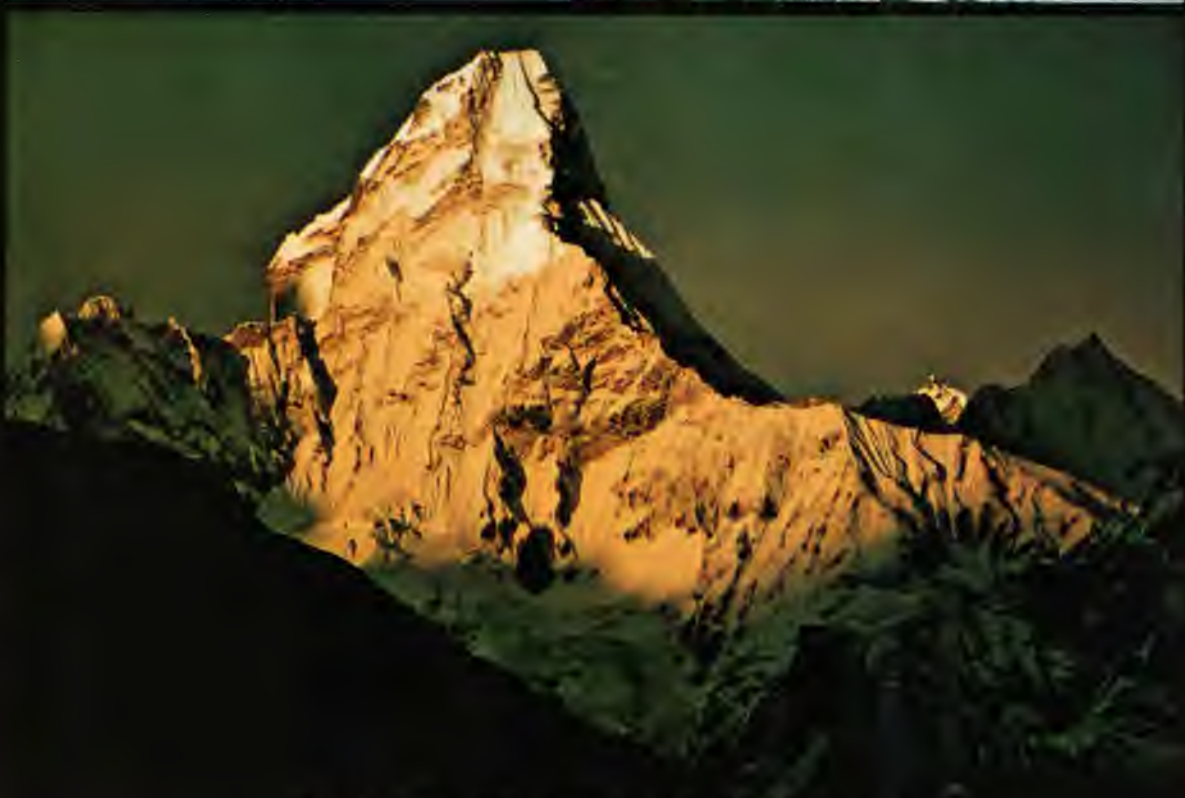
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Art Zwomey and the Canon F-1



Photos taken with Canon F-1, FD 35-70mm f2.8-3.5 SSC and
FD 20mm f2.8 SSC lenses, ASA 64 film.

"I captured the essence of Everest in the Canon F-1."

An assault on Mt. Everest isn't just a climb. It's an undertaking. As difficult and dangerous as the climb itself is, the logistical problems are what really set it apart. This year, Art Twomey was the photographer member of the New Zealand Everest expedition. To qualify, he had to be more than just a photographer. He had to be an expert climber, with the endurance to meet the tremendous strain Everest puts on everyone who attempts the feat. He also had to have the expert's eye towards evaluating every single piece of equipment he took on the assault, because on Everest everything must perform the first time around. So for the trip, he selected the F-1 as his only camera. Part of the reason for this was the F-1's renowned ruggedness. "The F-1 and lenses I had worked faultlessly from the jungles of Nepal right up to the sub-zero temperatures at 26,000 feet—and the cameras weren't even winterized" he says. "On Everest, every piece of equipment has to work perfectly. And the F-1 system I took certainly did."

Because Twomey's party used no porters, every piece of equipment had to be carried by the climbers themselves. And every spare ounce had to be scrutinized. "On Everest, everything is a hell of a strain. All you're thinking about is putting one foot in front of the other. Oxygen is at a premium, and sometimes it's too much effort even to change lenses. That's why I took the FD 35-70mm f2.8-3.5 SSC zoom and FD 20mm f2.8 SSC lenses as my lenses for



the assault. I was exceptionally pleased by the quality and performance of the zoom—its versatility is amazing. I used it at low levels along the way and on the mountain itself, and it handled every type of photographic situation with outstanding ease—and without lugging along redundant equipment."

More and more photographers are turning to the F-1 system because of the unique camera/lens combinations it offers. The F-1 body with a Canon FD zoom lens can handle almost any photographic situation with the quality of a prime lens. One reason for this is the unusual quality of F-1 system com-

ponents. Without super-precise assembly and construction, even the best optics can't perform to meet the extremes of professional work. This is especially true of zoom lenses, with their highly complex internal movements.

Although he was previously a large-format photographer, using the Canon F-1 has changed Art Twomey's mind about the state of the 35mm art: "I've found that using the F-1 system, I can get as much information on 35mm as on larger formats. The Everest trip proved that. And judging from the results of the photography I did on the mountain, I'm confident that the F-1 can do any job it has to do."

You don't have to make the 65-day climb onto Mt. Everest to appreciate the F-1 system's flexibility and ruggedness. All you need is an understanding of what the finest photographic equipment can do for your pictures. If you have it, you'll know the F-1 is your kind of system.

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The AE-1 is an automatic exposure single-lens reflex camera that offers full system versatility *plus* focus-and-click ease of operation. It's for the photographer who has been waiting for a



high performance camera that can deliver a new creative freedom through



automation. The AT-1 is a new definition of what an ideal match-needle exposure metering SLR should be. Since it was developed with the AE-1, it has many of the same components, for outstanding speed and efficiency of operation. It's for the photographer who wants state-of-the-art capability in a traditional format.

Because both cameras share a common technology, they also share

Conventional photography
redefined.



AT-1

things like the Power Winder A (for motorized photography at up to nearly 2 fps at speeds above 1/60 sec.), Speedlite 155A (an automatic electronic flash that sets aperture and shutter speed on the AE-1 and shutter speed on the AT-1) and Databack A, for recording important information directly on the film while shooting. And, both cameras accept all the nearly forty superb Canon

FD lenses, from Fish Eye to Super Telephoto and many Canon accessories, for almost any photographic application.

Any way you look at it, the AE-1 and AT-1 are two cameras whose time has come. And the time to see them is now. At your local camera specialty dealer's.



Canon®

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 Canon USA, Inc., 140 Industrial Drive, Elmhurst, Illinois 60126
 Canon USA, Inc., 123 Paularino Avenue East, Costa Mesa, California 92626
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 Canon Optics & Business Machines Canada, Ltd., Ontario

The Vivitar VI™ Enlarger System With The Vivitar Dioptic™ Light Source.

*Classical optical bench engineering and the
use of a new light transmission device
makes possible an advanced technology enlarger system.*

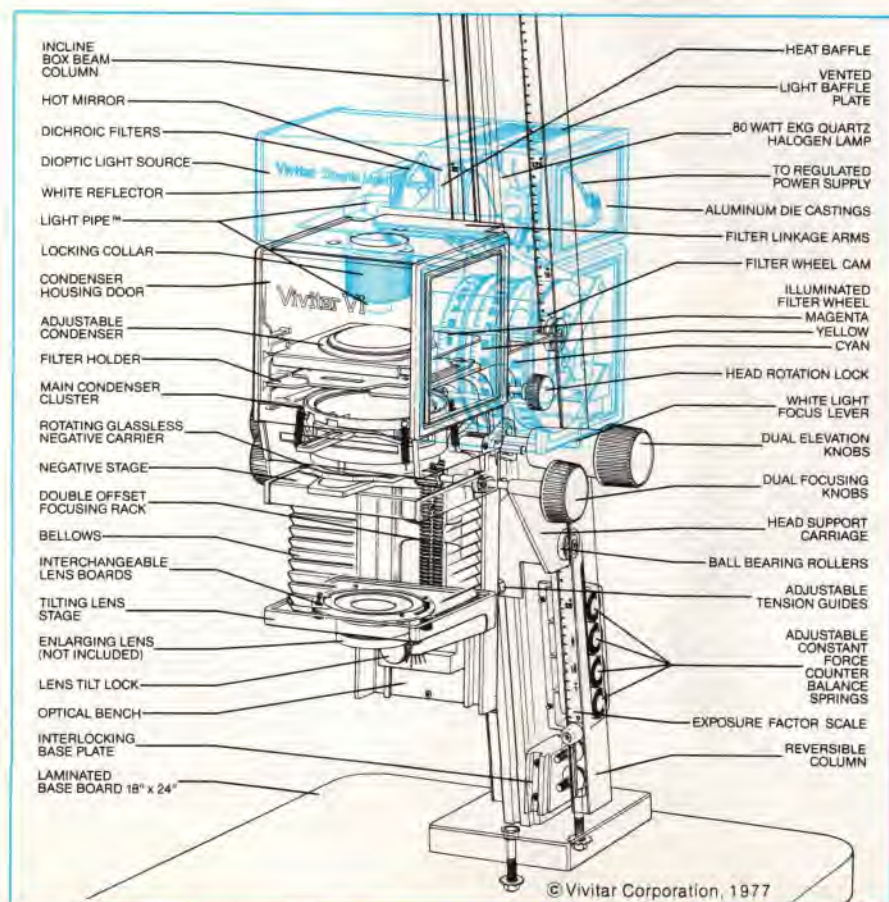
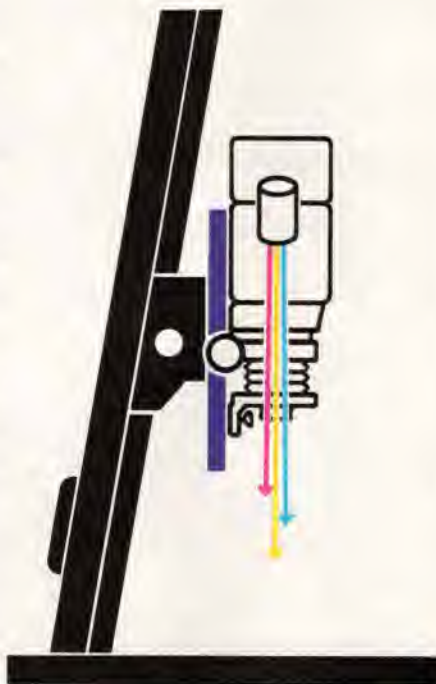
Vivitar has re-engineered the enlarger. Virtually every segment of typical enlarger construction was examined, rethought, and refined. And in two especially important areas Vivitar designers have made major breakthroughs.

The basic Vivitar VI™ is a black and white enlarger with all critical components from the light source to the lens stage secured to an optical bench. Everything moves on a massive, rigid column thus assuring precise alignment to the baseboard.

To transform to a precise color enlarger system, the designers invented the Amazing Light Pipe™* a rod of special acrylic material in a solid cylindrical mass, replacing the conventional integrating box. It mixes and transmits light without heat and without significant light loss. The Light Pipe is unique to the Vivitar Dioptic™ Light Source.

The massive, rigid column and extra-large baseboard (16" by 20" prints from 35mm are standard) enhance the professional appearance of this new enlarger system.

*Patent Pending



For more information on the Vivitar VI Enlarger and Vivitar Dioptic Light Source for black and white and/or color printing, please write to Vivitar, Dept. 73.

Better still, see a Vivitar dealer for a demonstration. The more experience you have with other enlargers, the more impressed you will be with this new-generation enlarger system.

Vivitar Corporation, 1630 Stewart Street, Santa Monica, CA 90406.

In Canada: Vivitar Canada Ltd./Ltée

Vivitar®

□ "Don't make waves." This familiar cliché sounds like pretty good advice, and it usually is. For example, you're about to return an ugly shirt given to you as a gift and suddenly you see that the same repulsive shirt is being proudly worn by the gorillalike complaint department clerk at your local store; in this instance you're smart if you "don't make waves." As with most sayings of this type, however, there are usually prominent exceptions, and Ambico, Inc., is an exceptional company. It is the same company responsible for the entire Camera Caddy line of photographic accessories (like wide camera straps, tote bags and brass belt buckles displaying the insignia of your favorite camera), and now Ambico has introduced a brand-new product guaranteed to make waves in your darkroom.

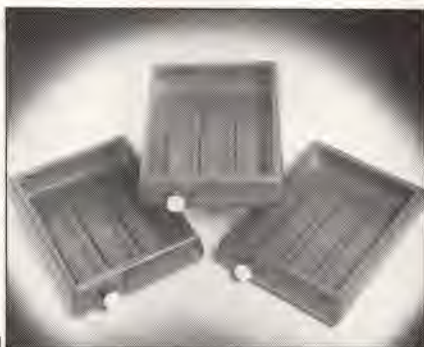
The product is called the Ambico Wave Tray, and it's one of the most innovative ideas in darkroom trays to come along since the ribbed-bottom tray was introduced many years ago. Among the more prominent features of this deceptively simple-looking device are the following—a partially rounded bottom that permits the user to push down or pull up on the tray front and then release—this action causes the developer, fixer or whatever solution you are using to slosh back and forth over the surface of the print roughly five to seven times before the process is repeated. The wave-action turbulence of these processing solutions over the print appears to be quite effective in producing even agitation.

As I indicated earlier, the print can be agitated in an intermittent fashion, or the tray can be constantly rocked for more active development. And since you only need print tongs to move the print from one tray to the next, the potential for scratching the soft emulsion with the tongs while agitating is greatly minimized. The oversized 8×10-inch trays (approximately 10×12½ inches) facilitate easy print removal, and the efficiency of the wave-action agitation may even allow you to work with less solution than you normally would.

The molded lip along the top edge of the three-inch high tray sidewall prevents accidental spilling of solutions when using or carrying the tray. This makes the tray ideally suited for use in a darkroom without running water. It allows you to mix and pour solutions elsewhere, and then carry the tray with the working solutions to your darkroom without leaving a chemical trail from room to room.

POINT SOURCE STEVEN ROSENBAUM

LOTS OF WAVES BUT NO BEACH



1. High sidewalls and a molded lip are just two of the many features to be found on the Ambico Wave Tray. Trays are available in bright colors to make them highly visible in darkroom.

2-3. Staplerlike device is called the Trimar Linker; while not specifically designed for photographic use, it has many darkroom and studio applications.

When emptying the Wave Tray, simply unscrew cap provided on one edge and pour chemicals back into your containers or down the drain using the built-in pouring spout. Be sure when cleaning trays that you also rinse pouring spout and cap before replacing them to prevent accidental contamination when using them again. Trays are also color coded to minimize possibility of such contamination. The Wave Tray sells for \$5, and by the time you read this they should be in plentiful supply at your local dealer. For more information check with your dealer or write Ambico, Inc., 101 Horton Avenue, Lynbrook, New York 11563.

THE MISSING LINK

The missing link in my darkroom has nothing to do with Darwin or theories of evolution. It has to do with an ingenious staplerlike device called the Trimar Linker, a new product, not specifically designed for photographic work, yet one that is ideally suited for countless photographic applications. The Linker is loaded with metal, tablike staples called links that come in a choice of either closed- or open-ended hooks. Once loaded, the Linker is used very much like a stapler. The links attach themselves via two pointed tabs that pierce the object and then fold over in the rear, a process that sounds much more complicated than it actually is.

I have found the Linker to be ideally suited for hanging film to dry. The links firmly attach themselves to the edges of wet film, and then they can be hooked over any convenient wire, nail or support without slipping, until film is dry.

The links are also well suited for use in combination with pegboard and hooks. Not only am I now better able to retrieve film instruction sheets, chemical mixing directions, etc., but this simple and effective device has helped me to organize my workshop as well—now you can begin to understand the missing link in my darkroom. This tool is so versatile around the house—as well as in the studio, gadget bag and darkroom—it seems that I never have it where I need it or when I need it!

Prices for the Linker with an assortment of hook and loop links start at \$19.95; if you would like more information about the product, write Advertising Products International, 465 Spring Road, Elmhurst, Illinois 60126. Incidentally, they also offer a host of other devices that may be of interest to you, such as stainless steel and battery-operated scissors and sign boards that are ideally suited for photographing vacation title slides, etc. □

□ Enlarging began with sunpower. Mirrors were used in those early days to reflect the rays of the sun through the negative and a lens onto a sheet of sensitized paper. Such early systems required that the enlarger be built into the darkroom or that the darkroom be built around the enlarger so it could stick out of the roof. As you might guess, the whole operation was more than a little inconvenient, especially on cloudy days, and not at all practical for those who liked to work at night. So amateur and professional alike avoided "making big 'uns out of little 'uns."

But as new light sources became available, the resourceful among us began to think big. By the mid-'20s, the practical electric light bulb was commonplace, yet not so common in enlargers. At that time light bulbs could only function in a reflex system; used directly, the bulb's filament would be projected, and every picture thus made would contain a glowing curl of wire printed in its center. Then came G.E. to the rescue with the first genuine enlarger bulb—it was frosted with the name stamped on its side, and with it came the enlarger, much as we now know it.

It took a surprising amount of time for enlargements to become popular. Of course, enlargements were expensive—not just relatively expensive but *very* expensive. Enlarging papers were very slow, and the whole process both time-consuming and labor intensive. So amateurs bought large-format cameras. Those taking "postcard" size negatives were very popular, and the 116/616 roll-film negative was the most popular box camera size until World War II. Early professionals had depended on large negatives as standard formats, and with the emulsions of the era it was just as well that contact prints were all that had to be derived from most of them.

Once the practical enlarger did arrive, it was a simple diffusion model, using a piece of ground or opal glass to spread light more or less evenly over the negative. My first enlarger was a Kodak Home Enlarging Outfit given me by my Uncle Joe; it consisted of a lamphouse that looked suspiciously like a safelight, and the lamp was set in the semicircular "can" with a sheet of opal glass on its open side. On one end, there was a bellows with a slide-in holder for the negative, which was retained in place between two sheets of glass. On the end of the bellows was mounted a Rapid Rectilinear lens with the amazing speed of $f/7.7$. By moving the bellows up and down on

VINTAGE VIEWFINDER

KALTON C. LAHUE

MAKING BIG 'UNS FROM LITTLE 'UNS



The Cadillac of prewar enlargers, the Simmons Omega A was introduced in 1938 for 35mm fans; the basic design continued for a quarter-century before being discontinued.

a pair of rods, you could focus the projected image on a board that had four spring arms to hold a sheet of paper by its corners. Exposing a sheet of Kodak Opal G paper with this outfit took roughly a day and a half, which did not exactly encourage its extensive use.

The millenium arrived (or so I thought) when I could finally afford a Federal enlarger. Located somewhere in Brooklyn, the Federal Manufacturing and Engineering Company turned out a wonderfully serviceable line of enlargers that many called junk, but the Model 219 became a classic, selling for about \$35 in the '40s. The wonder of the Federal line was that it even existed, and it wouldn't have had not some bright guy overcome the problem of hot spots. You see, even though the enlarging bulb had conquered the problem of the filament image reaching the paper, it had not solved the problem of the light resting above the *center* of the negative. But Federal hit the nail on the head when they simply took a sheet of clear glass and hit it square in the middle with a blast of sand. In so doing, the intensity of the light was evened out, and *voilà*, no hot spots!

Federal and a number of other companies really found their métier in the '30s when darkroom work became popular as a means of passing those cold depression nights. Kodak Kodabromide had reached an acceptable speed, and you could turn

out 8×10s for only about a dime apiece. But the idea about enlarging that most found difficult to believe was that you needed a lens for enlarging other than the one on the camera. Dozens of advertisements fostered this idea by stating that "All you do is remove the back of your camera and attach it to the lamphouse. The same fine lens that took the picture can now be used to enlarge it to giant proportions." It wasn't true, of course, but it sure sounded reasonable (and economical) even though the competition continued to inform us that enlarging lenses really needed a flatter field than the camera lens would provide.

The concept of one lens/two purposes also opened the door for a large number of garage workshops to get started in the photographic manufacturing business. The equipment they offered was basically a lamphouse, a pipe standard and some form of arm to hold the camera securely. The real economy models suggested that no baseboard would be necessary because "you simply screw the assembly down to your workbench" (everybody apparently had a workbench in those days) or used "a piece of board from your workshop" (something else everyone apparently had).

Many of these enlargers were offered as kits and turned out to be little more than a tin can, a light socket with cord and some standard pipe fittings. The more enterprising worked with horizontal designs and went bankrupt just as quickly as those with vertical offerings, yet some worked surprisingly well. Through the years of the golden '30s and '40s, a few small companies became very popular with their many variations of enlargers.

Of the many who entered the enlarger manufacturing business, only a few remain today as representative of the pioneer breed who succeeded. Simmons Brothers' Omega line is perhaps the most notable example, and it was only a few years ago that the company (no longer owned by Simmons) dispensed with the basic design that had carried it so far. Camera companies such as Argus and Ansco once made enlargers that used their cameras to provide the optical system and a means of focusing; their enlargers are no more, and their cameras are manufactured today in Japan. And Kodak? Well, Kodak finally brought out one of the ultimate enlarging systems of its day—the Precision A and B models. These and other larger-than-life triumphs of the past will be the center of next month's attention. □

Leigh Wiener shoots at the marina with the **New Asanuma Compact Candid Zoom.**

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Asanuma: Number One from Japan. Best able to sift, sort and discover the newest and most advanced in photo-optics.

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Minimum Aperture: 22. Filter Size: 62mm. Maximum Diameter: 68mm. Overall Length: 173.5mm. Weight: 880 g. Coating: Tokina Multicoating.



Asanuma 75-260 at 6". Only 2" longer than common 4" compact zooms and gives 110 extra millimeters.

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NEW MOUNT FOR A NEW FORMAT

Emde Products' new cardboard mount is designed for 6x4.5cm transparencies from Mamiya, Bronica and Hasselblad cameras in that format. Mounts are self-adhesive and are available 30 to a package for two 120 rolls or one 220 roll. Suggested retail price is \$4.95; for more information write Emde Products, 2040 Stoner Avenue, Los Angeles, California 90025.

(Continued on page 121)

Please mention PhotoGraphic Magazine when inquiring about the items listed in "Product Proof Sheet."

New product information should be sent to the attention of Elissa Rabellino, Associate Editor, PhotoGraphic Magazine, 8490 Sunset Boulevard, Los Angeles, California 90069.

SEAL'S COMPRESS AT \$187.50*, YOU CAN SWING IT.

Seal's compact 12" x 15" Compress is built to do everything the big Seal presses do. You can dry mount all types of photographs and produce beautifully textured prints using Seal's new Exhibitex™ photo texturizing process. All with professional results.

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□ "Whaddaya mean, 50 bucks for a couple of shots? It only took you a few seconds and a roll of film. Hell, I could have done the same thing with a box Brownie!"

To the early readers of PhotoGraphic the foregoing may sound familiar, since it is a verbatim excerpt of the opening of my February, 1973 column concerning the nitty-gritties of how and what to charge. However, that was over 4½ years ago, and in the interim we have been caught up in an inflationary spiral of such staggering proportions that prices have skyrocketed from 50 to 100 percent. In some cases, depending on the item purchased, the price has escalated from 150 to 200 percent. And I'm not only talking about coffee, cigarettes, postage stamps, new and old homes, gasoline and automobiles, but photographic equipment, film and supplies as well!

In early 1973 a 36-exposure roll of Kodak Tri-X Film had a list price of about \$1.30; today, the same roll of film lists for about \$1.95, which means that in 4½ years the cost of a roll of Tri-X has gone up over 50 percent! Flash cords, camera straps and other accessories have doubled in cost. Cameras and lenses have also been affected by the economy—as reflected in their price tags—all of which seriously reduces your margin of profit on any given job you do. In short, you may *think* you made money on the job, but in reality you may not have. So if you have any business acumen at all, you have already allowed for increased costs by raising your fees accordingly. So with today's inflation in mind let's take it from the top again: "Whaddaya mean, 100 bucks for a couple of shots?"

Fifty, 100, 200 dollars—it makes no difference—these figures are hypothetical. What does make a difference is that you must prepare yourself for static from some idiot who thinks that all you have to do is go *click*, and it's all over and done. The thought may never occur to the client that you had to set up lights in a studio or pack your gear and drive 15 or more miles to location and back, not to mention several hours of darkroom time. Just click—huh?

Permit me to digress for a moment by explaining that I am actually setting you up for future columns in which the emphasis will be placed on everything you want to know about how much to charge but don't know how to find out. I can guarantee that in the months to come I will be pounding your brains with all the ramifications of how much to charge, setting a fee for a job, the different

WHERE THE ACTION IS

DAVID SUTTON

UPDATE: HOW MUCH TO CHARGE



What price art? \$100? \$500? \$1000? Time, effort, expense, quality and use of the finished product are major factors in determining how much to charge. If you call the shots, you set the price. © David Sutton

prices obtained for advertising, commercial, publicity, aerial, underwater, calendars, postcards, posters, etc., and of course, what the going rates are for editorial photography.

I'll give you specific examples of prices paid for actual jobs, including my own. In some instances I will provide you with suggested guidelines; in others I will tell you exactly what the price should be, give or take a few dollars or so. For example, how much should you charge for a record album cover (color) for a major recording company? If it's an assignment, it is \$500 *plus* expenses! If it is a purchase, i.e., selling a shot from your files, the price would be \$500, period! I'll be going into much greater detail as we go along, so please be patient. I must take things step by step, job by job and price by price.

Bear in mind that whatever the situation or occasion, someone is in need of *your* photographic services, and invariably he will ask: "How much will it cost?" Five simple words that should automatically set off a chain reaction in your brain, evoking a five-word question of your own:

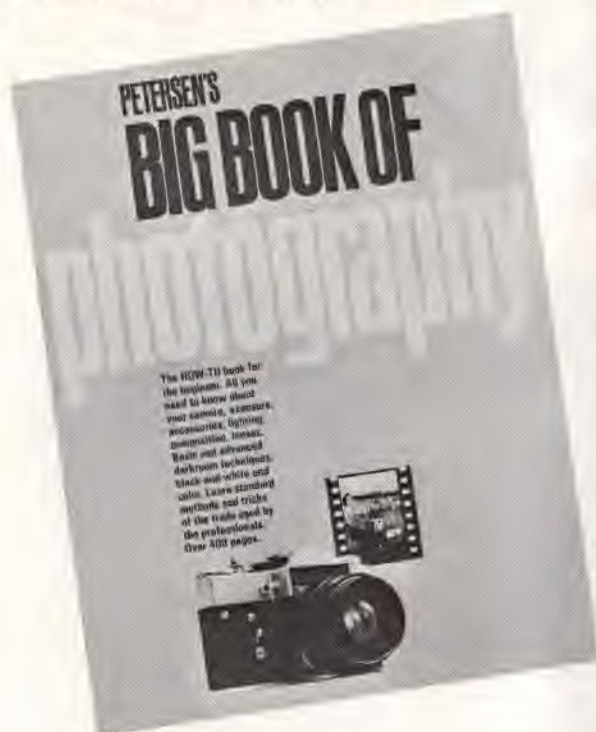
"How much do I charge?" As a beginner, your mind will be boggled by hundreds of other questions as well. You ponder whether or not you can expect to command the same price as an established pro; you also wonder if you are sufficiently equipped and experienced enough to accept the assignment in the first place. Perhaps you are a rank beginner. Your studio is the great outdoors; your office is a living room coffee table, at best, and your darkroom is a 2×6-foot hole-in-the-wall closet (mine was only 2×4). You have little if any overhead, a minimum of equipment and only the vaguest ideas (if any) of how much to charge for your work. But, you *know* you are good!

You have all the potential. You are developing technical consistency and quality in your photography, and what's more, you are going to become even better. Eventually, you will charge accordingly and with complete confidence. You will learn that a black-and-white shot used for a full-page ad in a large newspaper might bring payment of \$500 or more, depending upon the nature of the photograph or assignment plus your reputation and quality of your work. The same shot for a trade journal might only pay \$300. If it's a color shot, you can figure double—at the minimum. Again, the same color shot used as a point of sale (counter display) provides billing in the \$750 to \$1000 range, perhaps more. That same color shot used as a full-page ad in a leading national magazine will command no less than \$1000 but more likely \$1500 to \$2000. And depending on other considerations, the price might be \$3000 or even \$5000 for some—it all depends!

The foregoing is a capsule indication of how, depending upon use, a photograph will bring anywhere from \$500 to \$5000, depending almost entirely on how and under what circumstances the photograph was produced and by whom (and for what) it was ultimately used.

In the meantime, the thought of setting a price may be driving you up the wall—you are afraid to charge too little or too much. How do you figure it all out? Well, frankly, this is a tough one for all of us—just be assured that we've all suffered through it at one point or another. The question of "how much to charge" seems ever present, and the answer can be as mystifying as the *Mona Lisa's* smile. I'll be pursuing things much further and in greater detail in upcoming columns, but in the meantime, keep in mind that if your work is of professional caliber, then by all means charge a professional price. □

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Wide-Angle Filtermatic



ANGLE OF VIEW: 100°
NUMBER OF ELEMENTS: 12 elements in 9 groups
ACCESSORY SIZE: 77mm
APERTURE RANGE: f/2.8 to f/22
FOCUSING RANGE: 6.6 inches (17cm) to infinity
CLOSE FOCUS MAGNIFICATION: 1:9.09
DEPTH-OF-FIELD SCALE: Yes
INFRARED FOCUSING MARK: Yes
LENS COATING: Multicoated
WEIGHT: 21 ozs. (600g)
FINISH: Black anodized
LENGTH FROM FRONT TO FLANGE, AT INFINITY: 3.25 inches (80mm)
MAXIMUM BARREL DIAMETER: 2.75 inches (69mm)
CLICK STOPS: Full- and half-stop detents
ROTATION DIRECTION FROM INFINITY TO CLOSE-UP, IN USE: Clockwise
BUILT-IN LENS HOOD: Yes
SPECIAL FEATURES: Filtermatic (four built-in filters)
MOUNTS AVAILABLE: Pentax K, Pentax ES, Canon, Konica, Minolta, Nikon, Olympus, Voigtlander/Rollei
PRICE: \$250 with front and rear lens caps
DISTRIBUTOR: Ehrenreich Photo-Optical Industries, Inc., 101 Crossways Park West, Woodbury, New York 11797

LENS: Sigma 70-150mm f/3.5
Macro Zoom



ANGLE OF VIEW: Min. 16°; max. 34°
NUMBER OF ELEMENTS: 12 elements in 9 groups
ACCESSORY SIZE: 52mm and 62mm
APERTURE RANGE: f/3.5 to f/22
FOCUSING RANGE: 6.6 feet to infinity in normal mode, 22 inches (56cm) to infinity in macro mode
CLOSE FOCUS MAGNIFICATION: 1:5
DEPTH-OF-FIELD SCALE: Yes
INFRARED FOCUSING MARK: No
WEIGHT: 21 ozs. (600g)
FINISH: Black anodized
LENGTH FROM FRONT TO FLANGE, AT INFINITY: 5.25 inches (130mm)
MAXIMUM BARREL DIAMETER: 3 inches (73mm)
CLICK STOPS: Full- and half-stop detents
ROTATION DIRECTION FROM INFINITY TO CLOSE-UP, IN USE: Clockwise
BUILT-IN LENS HOOD: Included but not built-in
SPECIAL FEATURES: Push-pull zoom; one-touch macro
MOUNTS AVAILABLE: Pentax K, Pentax ES, Canon, Konica, Minolta, Nikon, Olympus, Voigtlander/Rollei
PRICE: \$249 with front and rear lens caps and lens hood
DISTRIBUTOR: Ehrenreich Photo-Optical Industries, Inc., 101 Crossways Park West, Woodbury, New York 11797

LENS: Sigma 28mm f/2.8
Wide-Angle Filtermatic



ANGLE OF VIEW: 74°
NUMBER OF ELEMENTS: 8 elements in 7 groups
ACCESSORY SIZE: 52mm and 62mm
APERTURE RANGE: f/2.8 to f/22
FOCUSING RANGE: 12 inches (30cm) to infinity
CLOSE FOCUS MAGNIFICATION: 1:10
DEPTH-OF-FIELD SCALE: Yes
INFRARED FOCUSING MARK: No
LENS COATING: Multicoated
WEIGHT: 8.75 ozs. (250g)
FINISH: Black anodized
LENGTH FROM FRONT TO FLANGE, AT INFINITY: 3 inches (71mm)
MAXIMUM BARREL DIAMETER: 2 inches (52mm)
CLICK STOPS: Full- and half-stop detents
ROTATION DIRECTION FROM INFINITY TO CLOSE-UP, IN USE: Clockwise
BUILT-IN LENS HOOD: Included but not built-in
SPECIAL FEATURES: Filtermatic (four built-in filters)
MOUNTS AVAILABLE: Pentax K, Pentax ES, Canon, Konica, Minolta, Nikon, Olympus, Voigtlander/Rollei
PRICE: \$160 with front and rear lens caps and lens hood
DISTRIBUTOR: Ehrenreich Photo-Optical Industries, Inc., 101 Crossways Park West, Woodbury, New York 11797

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In Canada: Anglophoto, Inc., Montreal.



*The 257, 407, 507
and 607 models

**OUR NEW
SLIDE CUBE™ SYSTEM II
WILL TOPPLE ALL YOUR NOTIONS
ABOUT SLIDE PROJECTION
AND STORAGE.**



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The most important of all criteria for judging any slide projector is the image it projects on the screen. That's why we want you to see our new line of Slide Cube Projectors in action.

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Best of all, Slide Cube Cartridges store your slides in one-eighth the space for about one-third the cost of round trays.

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THE NEW BELL & HOWELL SLIDE CUBE SYSTEM II



Astonishing results can be achieved by pushing the new Kodak Ektachrome 200 Professional Film to a negative in the C-41 process. Incredible E.I.s of up to 10,000, pointillistic grain structure and a marked increase in contrast and color saturation can be obtained by this simple process. Although comparable limitations exist with this combination, the process gives the photographer fresh inroads into creative imagery.

The professional photographer is constantly in search of innovative methods of depicting his/her ideas on film. "Pushing," or extending the exposure range of transparency film by underexposing and overdeveloping, has long been both a necessary and creative part of the professional's bag of tricks. Virtually every type of photographer, from the sports cameraman to the high fashion photographer, has a need for the added speed or unusual effects that pushing chromes to negs can provide.

Previously, the C-22 process has been the solution to the creative photographer's needs. However, since Kodak eventually will be phasing out all of its C-22 chemistry, it is necessary to adapt a new method, and the C-41 process is presently the only logical alternative.

It would seem, at first, that the new E-6 film and the C-41 process are highly incompatible. One is a high speed transparency film and the other

a color negative development process. However, they were both designed and inaugurated to significantly reduce processing time by raising the developer temperature. Without getting bogged down in a technological summary of the two, suffice it to say that the common denominator between them is silver.

All films, whether black-and-white, color negative or color transparency material, contain silver halide compounds which, when exposed to light and subsequently developed in a suitable chemical, produce visible grains of metallic silver—an image. When the exposed silver image in Ektachrome 200 Professional film is developed out in a high energy black-and-white developer such as Acufine and then fixed and bleached, the resultant image is a pale, ivory-colored negative which, when processed normally in C-41 chemistry, yields a brightly colored, maskless color negative.

One aspect of this unusual process you'll have to consider before plunging in will be the availability of the C-41 development. Many commercial labs are reluctant to develop pushed Ektachrome in their C-41 lines because they fear costly contamination. However, if you can convince your

local lab that the film has been thoroughly washed and that no wetting agents have been used prior to drying the film, then they might process it for you. Unfortunately, most labs I have used wouldn't touch it or, if they do, might charge \$40 or more for one roll. This is unfortunate because I have never experienced any contamination problems or even heard of any when the film has been properly washed and dried.

But you do have another alternative available. Kodak sells C-41 Flexicolor chemistry for home use for under \$12, and it is easily attainable, simple to use and quite self-explanatory.

MATERIALS

The materials you'll need to produce your own unique negatives are: a few rolls of Ektachrome 200 Professional film, a pint-sized container of Acufine developer (mixed with distilled water), Kodak Color Film Liquid Fix (diluted for either C-22 or E-3) or any nonhardening fix, some C-22 or C-41 bleach and the C-41 Flexicolor Processing kit. You can purchase all of the supplies at your local camera store with the exception of the C-22 bleach, which might have to be specially ordered. (Even though the C-22 bleach is slightly more efficient than the C-41 bleach, it is just as convenient to use the same bleach packaged with the C-41 Flexicolor kit for both phases of the process.)

All of the reels and tanks that you'd normally use for black-and-white

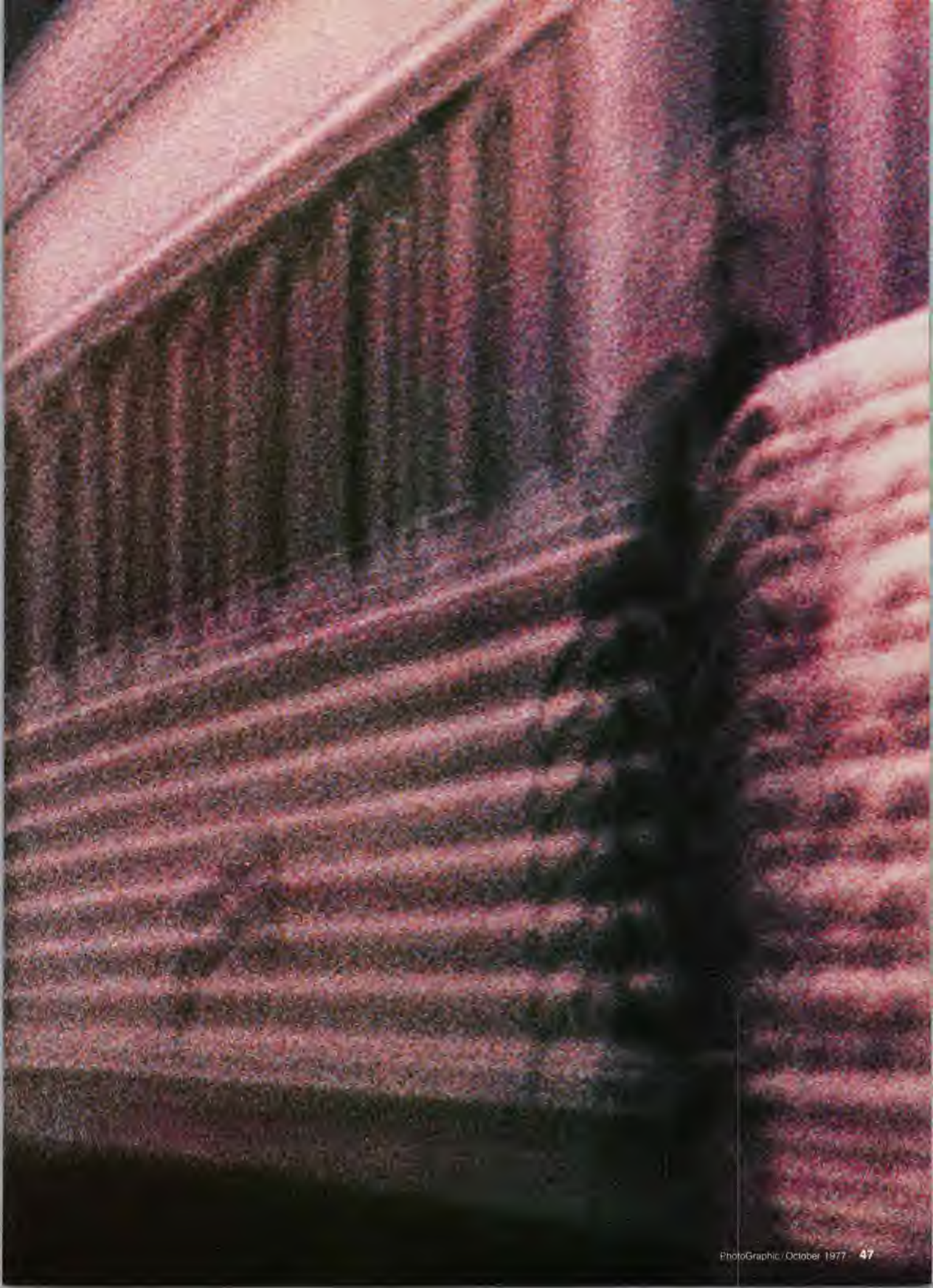
SHOOT E-6 AT 10,000 E.I. BE PREPARED FOR SPECTACULAR COLOR PRINTS

BY BILL HURTER



E-6 AT 10,000 E.I.

Photos illustrate varying film speeds and differing effects that can be achieved by pushing Ektachrome 200 Professional to a negative in C-41 process. Uncommonly short exposure time freezes swing of bat (photo No. 1); film rated at E.I. 1200. Night scene (photo No. 2) exhibits excellent shadow detail with Ektachrome rated at E.I. 5000. Unusual coloration of sunset is a direct result of processing transparency film as a negative; film rated at E.I. 1200. A slow shutter speed and E.I. 10,000 were used to record this fast-moving train at dusk. All photos made with Nikon F, 85mm f/1.8 and 300mm f/4.5 Nikkor lenses.





**"To do everything my Minolta XL-660 does,
I'd need a whole camera crew."**

—Cinematographer Owen Roizman
on the Minolta XL-660 Super-8
sound movie camera.

You can see Owen Roizman's latest work in MGM's Academy Award-winning *Network* from United Artists.

"On a major film, I have a whole camera crew working with me," he notes. "But on the movies I make at home just for fun, I let my Minolta XL-660 do all the work. And it's incredible how much sound and optical versatility it gives me."

Like a professional movie studio, the XL-660 has everything in it to turn out high-quality pictures with crisp, lively sound. And all the features you need to fulfill your potential as a filmmaker.

A 6-to-1 powered zoom lens gives you silky-smooth zooms—from wide-angle to telephoto. Switch it to "macro" and take stunning close-ups right up to the front surface of the lens. Viewing is through the lens... extremely bright with a split-image rangefinder center spot for precise, easy focusing. Built-in fade-ins and fade-outs of both picture and sound. And fully automatic through-the-lens exposure

setting, with an override for backlight. Optional XL-660 accessories include an FM wireless microphone kit for sound movies without wires between camera and subject. A boom mike and a zoom mike that pick up distant sounds from the camera. And a special attachment that lets you plug a second microphone, radio, TV, phono or tape recorder directly into your soundtrack. You can even mix sounds from separate sources. If you don't have a whole camera crew to work with, see the Minolta XL-660 at your photo dealer. He also has its companion models, the XL-440 and XL-225, with a few less features for less money. Or for more information, write Minolta Corporation, 101 Williams Drive, Ramsey, N.J. 07446. In Canada: Minolta Camera (Canada), Inc., Ontario.

**Hold a movie studio
in your hand.**

MINOLTA

E-6 AT 10,000 E.I.

development are more than adequate for this process. You will also need an accurate mercury thermometer and plastic bottles to store the C-41 chemicals.

The process is best carried out in two steps—the black-and-white development and the C-41 development. Since the first step is time-consuming and the C-41 requires absolute attention to temperature control, it is advisable to dry the film after the first step.

BLACK-AND-WHITE DEVELOPMENT

Since a detailed process such as this is subject to many variables, the development table should serve as a basic starting point for your unusual images. The secret to properly exposing your pushed transparencies is to bracket one full stop in both directions. The processing times and temperatures indicated in the development table are calculated for E.I.s 1200 and 10,000, respectively, but when your negatives are developed, you may find E.I. 2400 or E.I. 5000 to be the exposure that yields the most shadow and highlight detail. So experiment with both exposure and processing times to arrive at the right E.I. for you and your equipment.

Once film has washed for 30 minutes hang it up to air dry to conclude first step. It is essential that no wetting or preparatory solutions be used prior to drying. It is not important if film dries with watermarks, as it will be immersed in C-41 chemistry relatively soon.

C-41 DEVELOPMENT

At this stage your negatives will look cream colored and very, very thin, but this is natural so don't be alarmed. Once the color couplers in the film interact with the C-41 developing agent, both normal density and color saturation will appear.

Since the most explicit instructions are packaged with the C-41 Flexicolor chemistry, it is not imperative to reiterate all of them here. However, a point that deserves mentioning is that the developer's temperature tolerance of 100°F. $\pm$ ¼°F. must be strictly maintained. Since there is usually only one time/temperature combination for color films that will yield proper contrast and color balance in all three sensitized layers of the film simultaneously, a water jacket should be used to keep chemicals at 100°F. Although only the developer must be kept at 100°F., it is a good idea to keep all chemicals as close to 100°F. as possible to minimize grain enlargement. The water jacket, once stabilized, will insure proper temperature balance for the duration of the process.

When you finish the C-41 step of the process and unload your film from the reels, you will see color negatives like you've never seen before. Highlights will be bold and dense, while shadow detail will be more than adequate. The cleared portions of the film will be pink instead of the familiar orange coloring of Vericolor and Kodacolor negatives, and you will instantly notice the overall image sharpness. Colors will appear exaggerated and posterlike in saturation.

DEVELOPMENT TABLE STEP I: BLACK-AND-WHITE DEVELOPMENT

Solution	Time	Temperature	Agitation
1. Acufine (E.I. 1200)	12 min.	75°F.	30 sec.*
Acufine (E.I. 10,000)	25 min.	75°F.	30 sec.
2. Water stop	30 sec.	75°F.	Continuous
3. Color film fix	5 min.	75°F.	1 min.**
Remainder carried out under normal room lights.			
4. Wash	15 min.	75°F.	N/A
5. C-22 or C-41 Bleach	15 min.	75°F.	1 min.
6. Wash	30 min.	75°F.	N/A
7. Dry		Room Temp.	

*Agitate for five seconds every 30 seconds

**Agitate for 15 seconds every minute

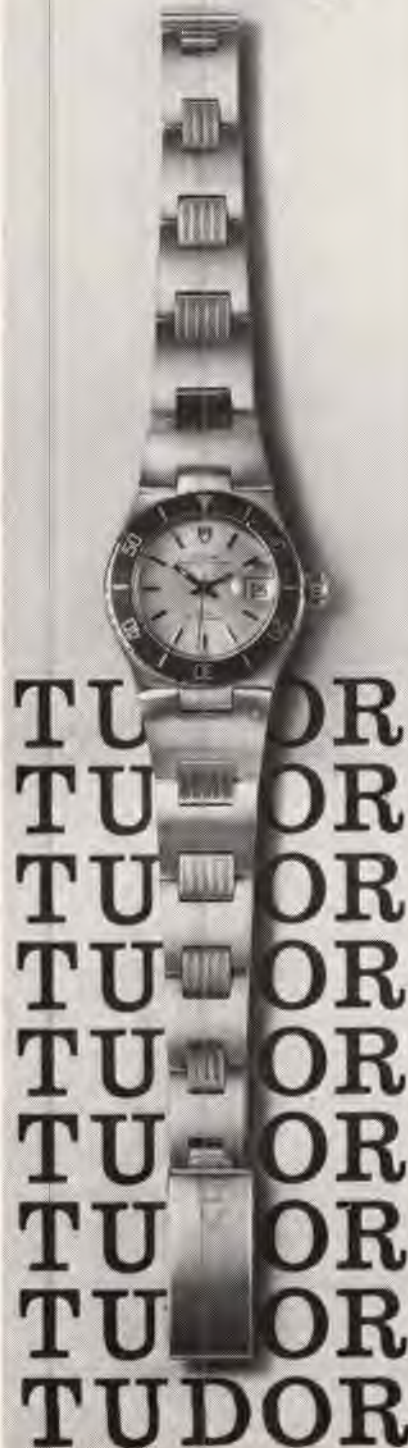
STEP II: C-41 DEVELOPMENT

Follow instructions in C-41 Flexicolor Processing Kit; entire C-41 process to be carried out under normal room lights.

The Time Machine

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E-6 AT 10,000 E.I.

EVALUATING EXPOSURES

A good procedure for choosing the best exposures to have printed is to place the negatives on a light box and examine them with a fairly strong magnifier. The negs that have good detail in the shadow areas and highlights that aren't blocked up are properly exposed and should print with a minimum of difficulty. Record your data as to which E.I. provided the best negatives, and you have the system under control. For example, if your particular roll was exposed at E.I. 10,000, and you bracketed one stop in either direction, one-stop overexposure would be E.I. 5000, and one-stop underexposure would be equal to E.I. 20,000.

If you are going to print these negatives yourself, a few words of advice are in order. A low-contrast, pushed neg will print like any normal color negative, except you will be printing with approximately .20 to .30 additional points of yellow than are usual in the enlarger. This is a result of the absence of the traditional orange mask in the pushed negatives.

Problems arise when printing negatives with a fairly strong contrast ratio (1:8 or more). Since a contrasty negative with good shadow detail will have overly dense highlights, long printing times are inevitable. It is not uncommon to have exposure times of 80 to 100 seconds with the enlarging lens wide open! These lengthy exposures may cause the negative to buckle and the grain to pop out of focus, forcing you to go back into the darkroom to reprint. For the most part, though, you can usually tell which negs will give you problems by carefully examining them first.

RESULTS

Up to this point, you must imagine that pushing chromes to negs is a difficult and tedious endeavor. Actually, it's a very simple and enjoyable process. The technical instructions outlined here are only meant to simplify the process and enhance your understanding of technical details. The results that can be achieved with this combination are as limitless as your imagination and as diverse as your subject matter.

The most impressive aspect of the process is the speed to which the Ektachrome 200 Professional film can be pushed. E.I.s of up to 10,000 are not uncommon with excellent shadow



ALL PHOTOS BY THE AUTHOR.



1. All that's necessary to process Kodak Ektachrome 200 Professional Film as a negative. Everything you need can be purchased at your local camera store.
2. A standard developing tray makes a perfect water jacket for controlling temperatures of C-41 chemistry.

detail. Entire new picture-taking vistas open up to you. You can shoot in the blackness of night, in low light levels indoors or experience the subtle beauty of predawn hours without the nagging fear that your film will appear unexposed. Whether you're shooting action or scenics, the uncommonly short exposure times help create unworldly and intimate images.

The effect of the oversized grain is both striking and beautiful. When viewed up close, the grain resembles tiny points of rainbowlike colors. When viewed in perspective, the print projects an overall luminosity that gives a greater feeling of life and depth. For subject matter that requires clarity and sharp edge delineation this technique could easily prove disastrous. But for scenes or subjects where you want to impart mood and feeling pushing chromes to negs is a natural.

Since Ektachrome film is initially a transparency film, it is that much sharper than its equivalent in negative material. Even with exaggerated grain structure, the film is still sharp enough to enlarge to 11 x 14 or larger without image deterioration.

FORETHOUGHT AND DELIBERATION

Contrast is the element of this

process that is most important to judge at the picture-taking stage. A little practice will help you see what scenes are appropriate for this process and which ones to avoid. Since contrast is appreciably increased by the push process, a scene with very little contrast will appear to be of average or above-average contrast in the final print. Similarly, a scene with bright highlights and deep shadows will wind up looking more like it was made on litho film than a continuous-tone print. Certain scenes such as sunsets or landscapes with portions of sky in them will most certainly fool you the first time around. The sky—even a deep north sky—will radiate much more light than your meter indicates, and you will probably end up with a negative in which the sky is tremendously overexposed. A good idea is to shoot landscapes without the horizon line or scenes in which lighting and contrast are even throughout.

Exposure latitude is another area where some deliberation will prove helpful. Since the new E-6 films contain less silver than their predecessors, your exposure latitude is already slightly curtailed. When pushing the film, latitude is further reduced. This is why bracketing is so essential.

When I encounter something that I really want to get on film, I bracket in half-stop as well as full-stop increments to insure getting a properly exposed negative. Again, experience is the best teacher, and after a few tries you will have a better idea of how much light a given scene will need.

The area where pushing chromes to negs is really exceptional is in color saturation. With the increase in contrast a noticeable increase in color saturation occurs. Colors become bolder, more brilliant and give the composition an almost abstract quality.

Surprisingly enough, the overall color balance is not greatly affected by the push process. This makes it an ideal technique for situations that require mood but in which proper color rendition must be maintained.

If you've become tired of merely clicking off exact likenesses of your subjects and want to get back some of the excitement you first experienced in photography, then this creative process is for you. Bold, abstract colors, new areas of visual exploration and impressionistic, intimate images will be the rewards of the simple and enjoyable process of pushing your transparencies to negatives. □

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BRAUN



Make a movie using just one roll of film? The concept sounds a bit ludicrous, doesn't it? What kind of film could possibly be made on just three minutes of super 8 camera stock? And why would anyone ever want to even attempt such a feat? The purpose of this exercise will be made scintillatingly evident once we begin to examine and then discard some traditional ideas about moviemaking.

Most home movies are made in one of two ways. The most common can be referred to as the "snapshot style," because it is the filmic equivalent of the haphazard, throwaway style of shooting practiced by many still photographers. Taking this approach, you buy a movie camera, read the instruction manual and go out and shoot. Scenes are filmed at random, in a rambling or chaotic order. When the film comes back from the lab, the footage is screened, put away and forgotten. Although some very good shots may have resulted from the excursion, they are often buried in a mass of extraneous footage that makes the few hits difficult to locate among the misses. Since movies take place in time, the wait for "the good parts" to come on the screen can be tedious for audience and filmmaker alike when the images are projected.

A more interesting and challenging movie technique involves planning a film, shooting scenes, screening them, then cutting them apart and rearranging and assembling the film into some sort of structure that makes a statement, expresses a feeling or documents an event.

Both the snapshot style and the more professional method of approaching filmmaking tend to use up quite a lot of film. There's a lot of wasted footage in the former method because the filmmaker doesn't really know what he/she wants to capture on film in the first place or what to do with the interesting fragments that happen to turn up. With the latter method there's a constant temptation to overshoot, to make scenes longer than necessary, to include irrelevant shots just because they are there and to forget to film certain angles or details that could have added to the film's structure.

The third alternative, made marvelously apparent by the new Polaroid Polavision system but applicable to any filmmaking equipment or system, is to make a movie using just one roll, cassette or cartridge of film. Think of the possibilities! If each roll of film contains a complete movie, the finished work



FILMMAKERS' WORKSHOP, PART VII MAKE A MOVIE ON ONE ROLL OF FILM

BY MARKENE KRUSE-SMITH

A MOVIE ON ONE ROLL OF FILM

will have to be short, concise and subject-specific. One-roll movies provide one essential limitation—their duration—and this can work in your favor, since the time limit necessitates planning before you even begin to shoot. If everyone made one-roll movies, countless audiences would be spared the slow agony known to long-suffering friends and relatives as "torture by celluloid."

The one-roll concept was inspired by the introduction of Polaroid's instant movie system. The new equipment presents a number of fascinating issues for photographers, filmmakers and anyone who's even remotely interested in moviemaking. With Polavision it's possible to make a film, have it developed and screen the finished work in less than five minutes. The key to the almost magical new system is the fact that the film never leaves the cassette it comes in.

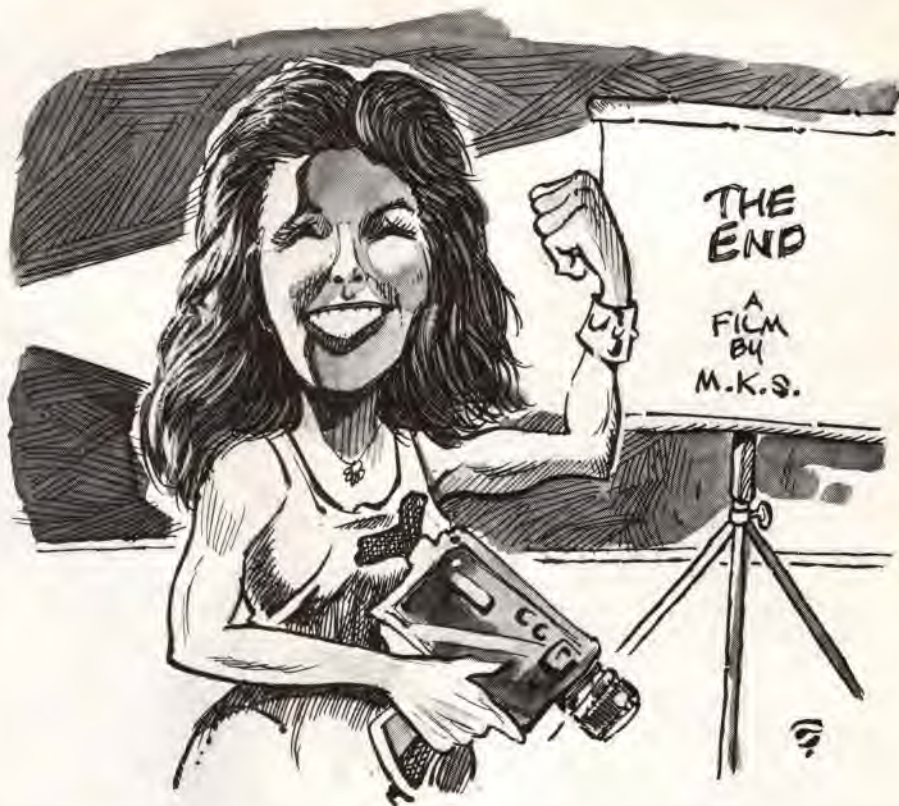
Many serious super 8 filmmakers, however, are already hatching plans to somehow pry open the cassette, remove the processed film, edit the footage together and then try to wind it back into the cassette for viewing on the Polaroid player. In case rewind attempts fail, schemes are being devised to modify super 8 projectors by substituting a high-intensity bulb that will provide sufficient illumination to view the projected Polavision images on a screen or wall.

But these ingenious plots defeat the purpose for which the instant movie system was designed. The joy of Polavision is in its immediacy and its simplicity. The 43 feet of film contained inside the Polaroid cassette will provide two minutes and 40 seconds of documents, dreams, fantasies, adventures and fun. Less than three minutes' worth may seem like a somewhat thin slice of the cosmic pie, but less may turn out to be more than you think.

THE CONCEPT

Begin with an idea. With only a few minutes of film at your disposal it's best to keep your subject simple and to the point. Stay with a single concept. It's far better to fully explore one thought, view or statement than to launch into a complicated plan that cannot possibly be executed within the amount of time it takes to use up the movie film.

Once you have an idea for a three-minute film, ask yourself why you want to make it, who and what should be



included, when and where you want to shoot and how you will go about filming. What equipment will be necessary? Sometimes it helps to make a list: camera, film, batteries, a tripod, props and lights will probably be included.

While you're waiting for the muse to present you with The Perfect Idea, neatly packaged, bedecked with ribbons and nestled on a sterling silver tea tray, you might want to consider a few of the following single-concept movie possibilities:

1. *Interview someone:* This idea is ideal for use with a sound camera because if you're lucky you can film the interview all in one take. Interviews often work beautifully when the subject is a small child, since you can involve the youngster in a kind of "show-and-tell" game. Ask questions that will elicit detailed responses, questions that can't be answered with a simple "yes" or "no." For example, "What did you do today?" will evoke a much better response than "Did you have fun today?" You might ask the child to tell you a story or to show you some of his/her favorite toys, books or drawings. Encourage your subject to talk to the camera. Play with the child's imagination while you film. Moviemaking should be introduced as a game that's fun, not some tedious exercise devised to appease the grownups. When kids see themselves in one or two

interview-type films, they are fascinated, and they're eager to perform in future minimovies.

2. *Plan a skit:* One humorous device is to use images and sound that are incongruent. This is easy to do by first filming the action M.O.S. (without sound), then by adding a sound track to the film's magnetic stripe when the developed images come back from the lab. For example, the sound could consist of a woman's voice. She is giving the recipe for her famous beef stew. "Well, I cut up a lot of vegetables, let them simmer for several hours over low heat, then add the spices. I never measure. I like to use a little of this, a little of that." But the picture would show a housewife demonstrating how to operate a kitchen garbage compactor. She stuffs potato peels, carrot tops, empty milk cartons and soup cans into the machine, pushes the button and neatly compresses her trash. Just as the sound track is concluding, "I usually sprinkle a bit of paprika or chopped parsley on the top just before serving," the picture shows the neatly compacted cube of garbage being removed from the compactor. Yummy!

3. *Make a travel film:* When you're on the road you're bombarded with exciting new images. Since they usually try to make straightforward records, most peripatetic filmmakers tend to forget all the interesting ideas they exper-

iment with at home in favor of capturing what often turn out to be banal scenes in living color. The biggest problem with most amateur travel films is that there is little continuity, camera angles are monotonous and technique is forgotten.

To avoid these pedestrian pitfalls experiment with creative cinematic techniques while zeroing in on one particular aspect of the people or the location you're visiting. You'll never get the whole trip on film anyway. If you're going to be in Mazatlan this winter, for example, consider what is noteworthy about the town. It is a small fishing village on the west coast of Mexico. You can see modern hotels and bikini-clad bodies bronzing in the sun all over the world, so why not search out something more interesting to film, something truly indigenous to the culture of the region? What about getting up early to film the fishing boats as they set off in the morning, and then shooting them again as the fisherfolk return with their catches at the end of the day? Film the pearl divers, the fish markets and the toothless, old women selling shrimp on the sidewalks.

FILMING TECHNIQUES

Scenes must be filmed in their proper sequence, since your three-minute movie will not be edited by cutting the film. Instead, the movie will be edited in the camera as you shoot. This is difficult at first, but with practice you can develop your eye and coordination until you're used to aiming, waiting for the right moment, squeezing the trigger for just the proper duration of the action you want to capture, then waiting for the next shot. The more one-roll movies you make, the better developed your reflexes and sense of timing will become.

Before you even pick up the camera, though, it might help to organize your thoughts if you make an outline on paper of the action to be included in the movie. Write the title at the top of the page, then list all the shots you plan to make. The shots should be numbered and arranged in the order in which they'll be seen in the finished movie.

Since you have a limited amount of film to use, every moment counts. Every shot should further the development of your concept or statement. At the same time, the film should be interesting visually. Don't shoot everything from one distance. Change camera angles, camera-to-subject distance and focal lengths to get a variety of perspectives on your subject. Use long shots, medium shots and close-ups to

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California	Nov. 10	New York	Nov. 17	Billings, Mont.	Dec. 10
Berkley	Nov. 3	Albany	Dec. 14	Birmingham, Ala.	Nov. 30
Buena Park	Nov. 7	New York	Nov. 15	Denver, Colo.	Nov. 1
Fresno	Nov. 5	Rochester	Nov. 16	Louisville, Ky.	Nov. 1
N. Hollywood	Nov. 11	Syracuse	Dec. 15	Madison, Wis.	Nov. 8
Sacramento	Nov. 2	Suffolk County, L.I.		Memphis, Tenn.	Dec. 1
San Diego	Nov. 9			Oklahoma City, Ok.	Nov. 30
San Francisco		Ohio	Nov. 3	Philadelphia, Pa.	Jan. 10
Florida		Cleveland	Nov. 2	Pikesville, Md.	Jan. 11
Fl. Lauderdale	Dec. 6	Columbus		Portland, Ore.	Dec. 8
Orlando	Dec. 7	Texas		Reading, Pa.	Dec. 12
St. Petersburg	Dec. 8	Dallas	Dec. 2	Saddlebrook, N.J.	Dec. 13
Illinois		Houston	Dec. 7	Seattle, Wash.	Dec. 6
Des Plaines	Nov. 10	San Antonio		Silver Spring, Md.	Jan. 12
Northbrook	Nov. 9			Wichita, Kan.	Nov. 29
Peoria	Oct. 27	Canada	Dec. 14		
Michigan		Edmonton, Alb.	Dec. 7		
Dearborn	Oct. 18	Vancouver, B.C.	Dec. 12		
Flint	Oct. 19	Winnipeg, Man.			
Grand Rapids	Oct. 20				
Lansing	Oct. 25	Other Cities/States			
St. Claire Shores	Oct. 26	Atlanta, Ga.	Nov. 29		
		Baton Rouge, La.	Dec. 9		

NOTE: All This Semester Schools start at 7 p.m. unless the date is within a [] which indicates that school starts at 12:30 p.m. Watch future ads for additional school.

Unicolor Division, Photo Systems, Inc., Dexter, Michigan 48130

Registration Form

☐ Enclosed is a self-addressed, stamped envelope and my check or money order for \$15.00. Please enroll me in This Semester to be held in _____ city _____ on _____ at _____ time _____ Tickets will be returned to you immediately upon receipt of your Registration.

Mail to:

Unicolor, This Semester, 7200 W. Huron River Drive, Dexter, Michigan 48130
Please Print

Name _____ Area Code: _____

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☐ I will be unable to attend This Semester; however, I wish to receive Unicolor's Self-Teach Color Darkroom Primer. Enclosed is my check or money order for \$6.00. Please mail it to me at the above address.

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A MOVIE ON ONE ROLL OF FILM

tell your story in an exciting way.

The first shot will probably be your title. It may be possible to adapt a "found object" title to your film. Perhaps a sign, calendar or newspaper headline will present a ready-made title. Or you can hand letter your own title. Film the title so that it will be on screen long enough to read the words

quickly through twice.

Whenever possible, if you know what is about to happen and where the camera and subject will be positioned, use a tripod. The resulting images will look much more professional since the film will be less jumpy when projected. Extreme close-ups must be made with a tripod to be certain the images remain sharp and steady. The longer the focal length, the more camera movement will be evident on screen.

MOVIEMAKING IN FOUR EASY STEPS



Polaroid's new instant movie system is perfectly suited for making single-concept films on just one cassette. Dr. Edwin Land of Polaroid says the new system represents "one of our earliest and most challenging dreams, which in coming to maturation has utilized all of our own accumulated understanding of optics, latent image formation, image transfer and image permanence, and issues from the enthusiastic efforts of hundreds of people in dozens of engineering, manufacturing and research teams."

The charismatic Dr. Land introduced the new Polavision movie system to 3800 shareholders, employees and members of the press last spring by letting each of us film for a few seconds with the new camera, then showing us the results of our experiments immediately. Our subjects were a bevy of tap-dancing, juggling, clowning

1. Drop the special Polaroid movie film cassette into camera by lining up arrows.
2. Aim camera and shoot. Cassette contains two minutes and 40 seconds of film.
3. Remove cassette from camera and drop it into Polavision player. Film rewinds and develops automatically in just 90 seconds.
4. Movie instantly appears on player's viewing screen. It can be popped out, stored on a bookshelf with other films in a home cassette library and played again and again by simply dropping cassette back into the viewer/player.

For a more detailed report on the new Polavision movies, see "Focus on Filmmaking: Polaroid's Instant Movies," page 18.

performers dressed in colorful costumes and gyrating to upbeat carnival music.

The demonstration showed everyone that all of the advanced technological research that went into the system's development began and ended with a simple concept—home movies can be as colorful, bright and easy to view as programs on your television set, and they can also be shot, developed and viewed in just a few minutes. □

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You can make enlargements from your favorite color negatives on KODAK EKTACOLOR 74 RC Paper in only 8 minutes with KODAK EKTAPRINT 2 Chemicals. Or you can use EKTAPRINT R-500 Chemicals for prints from slides on EKTACHROME RC Paper, Type 1993, in less than 10 minutes.

Need help in the darkroom? Kodak offers you a lot. KODEWORD™ Darkroom Audio Cassettes provide step-by-step, second-by-second recorded instructions for color and black-and-white film and paper processing.

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A MOVIE ON ONE ROLL OF FILM

Of course, there will be many situations where freedom of movement is more important than getting the steadyest images possible. The handheld camera gives the filmmaker a great deal more mobility. If it's necessary to really immerse yourself in the action and you're filming a spontaneous scene where you're not exactly certain where your subjects will be, then you won't want to be encumbered with a tripod.

SOUND

The simplest way to have sound with your movie when you show it is to shoot prestriped magnetic sound film in a super 8 sound camera, recording the sound as you shoot the picture. If you shot magnetically striped film but didn't record any sound, or if you shot silent super 8 film but have taken it to a lab to have a magnetic stripe added to the film after processing, you can record all manner of music, narration and special effects with a super 8 sound projector. The magnetic sound stripe works just like the magnetic sound tape in tape recorders. You can record sounds directly onto the tape stripe on the film.

If the film was shot silent and your projector is not a sound model, the easiest way to have sound effects when you show the film is to play a record or tape along with the picture. One very effective technique, in fact, is to select a record first, then shoot the visuals to accompany the music.

If you didn't have any specific music in mind to go with the film, it might be interesting to create your own. A great many sounds can be made using the human voice alone. You might want to get some friends together and record a song or collaborate on an instrumental tune. Other sounds can be improvised with a variety of different instruments and materials. Original music and effects could certainly be an appropriate sound track for a very original little motion picture.

Although you probably won't go on to make one-roll, three-minute movies your life's work, the challenge of making one complete statement on less than 50 feet of film can be exhilarating. It's the best way possible to practice conveying your ideas succinctly in a short amount of time. Single-concept movies trim the fat from your cinematic technique while sharpening your reflexes, honing your skills and improving your unique perception of the world around you.

Vivitar Series 1 35-85mm f2.8 variable focusing lens.



For many photographers a lens of this focal length range is an "ideal" lens covering wide angle, through normal, to medium telephoto. But for professional and scientific photographers the requirements of an "ideal" lens include more than a versatile range of focal lengths.

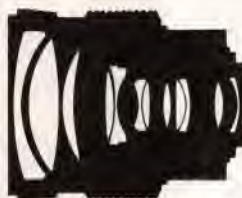
The assignment given by Vivitar to the Series 1 Research and Development Team included many complex design specifications, some conflicting, such as the need for a relatively high-speed lens and the insistence on compactness.

The specifications included the following: (1) A focal length range from 35 to 85mm. (2) Close focusing capability. (3) An f2.8 maximum aperture, so the lens could be used in place of a normal lens in low-light areas. (4) Length under 4 inches. (5) Weight under 30 ounces. (6) Contrast and resolution equal to or superior to comparable lenses. (7) Smooth but rugged mechanical operation. (8) Multicoating.

To accomplish all these requirements in one lens the team spent two years working with some of the world's largest computer banks. And instead of using the customary zoom lens configuration, which entailed some sacrifices in resolution at wide angle close focusing, the designers chose a variable focus solution. Changing the focal length is accomplished by movement of three independent floating groups in the lens, thus allowing close focusing to 4.3" from the front element (in the 35mm position), without sacrificing resolution. All done with a single-touch control.

The mechanical motion of these three groups is controlled by cams milled into sleeves. In order to achieve the extremely close tolerances specified by the Japanese mechanical designers, the cams had to be machined on specially-made, numerically-controlled lathes designed and built in Germany and Switzerland.

The extreme compactness of the lens itself necessitated the use of a nested series of cams and operating sleeves. Again, extremely close tolerances had to be maintained on the five concentric sleeves to eliminate centration errors. Even with the use of the most advanced optical equipment available today, to comply with the specifications each lens is individually adjusted by an engineer to ensure optimum optical alignment. The result is a valuable example of international cooperation, representing the combined efforts of Japanese, German and American specialists.



Optical Specifications	
Construction	12 elements 9 groups
Angle of view	28° to 63°
Minimum focus distance	
From film plane	10.2 in. (25.9 cm)
From front element	4.3 in. (10.9 cm)
Maximum reproduction ratio	1:3.5
Focal length ratio	2.4:1
Mechanical Specifications	
Filter size	72mm
Weight	27 oz. (770 gr.)
Length	3.6 in. (9.1 cm)
Max. diameter	3.19 in. (81mm)
F/number range	f2.8 to 16

Slip-on lens hood included. Available in mounts to fit Nikon, Canon, Minolta, Konic, Olympus OM, Pentax K/M, and Universal Thread Mount cameras.

Vivitar Series 1 Program

In recent years, remarkable progress has been made in solving some of the classic problems of optical design. Intensive work in the field was spurred on by the demands of space exploration and military applications and vastly aided by the growing sophistication of computer technology.

Vivitar optical designers, working with programs devised for highly specialized optical tasks, have used computer-generated designs to develop for Vivitar a new series of lenses capable of performance unreachable until now.

Each Vivitar Series 1 lens so far introduced represents a breakthrough in optical design. The 70-210mm f3.5 zoom is an easy to use lens offering

close-focusing capabilities in a remarkably compact configuration. The 135mm f2.3 and 200mm f3.0 are among the fastest telephoto lenses and are unusually light and compact.

The Series 1 Line also includes a compact, fast, internal focusing, wide angle 28mm f1.9 and a 90mm f2.5 macro that utilizes a floating group concept to maintain optimum performance from infinity to 1:1 life-size. Vivitar's 600mm f8.0 solid catadioptric lens represents three major advances in catadioptric design: compactness, durability and superior relative illumination.

Recently announced are a 24-48mm f3.8 wide-to-normal zoom lens and a 90-180mm f4.5 true flat-field zoom lens with close-focusing capabilities. There eventually will be a complete optical system of more than twenty Vivitar Series 1 lenses each representative of advanced technology and demonstrably superior to other lenses currently available.



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low-light color photography

A SPECTRUM OF FAST FILMS AND SHOOTING TECHNIQUES

by ED BECKER

Until just a few years ago, any shooting in low-light situations had to be done with black-and-white film. Pioneer low-light photographers made the graininess, higher contrast and various imperfections that are byproducts of increased film speeds work for them, allowing those effects to enhance the image rather than detract from it.

With the present availability of fast color films low-light photographers can now shoot in color. Whether this type of photography is called "available light," "existing light" or my own pet term, "prevailing light," it still requires using a relatively fast film (in some cases, one that may be pushed), fast lens, plus a slow shutter speed to obtain a photograph when the light level is low.

FILM

The results of dim-light shooting usually fall somewhere between exquisite achievement and technical catastrophe. A number of factors are at play in this area, one of the most important of which is film. Unless you use a fast film, you negate the double-barreled combination of fast film and fast lens, essential counterparts for any dim-light shots.

High-speed color negative films currently available include the following:

Fuji Fujicolor F-II Film (ASA 400)—This is a high-acutance film with wide exposure latitude that uses C-41 chemistry. Since Fuji does not have a processing division and the company has not announced whether or not there will be a home-processing kit available, I did not attempt to rate Fuji F-II higher than the normal ASA 400. Photo No. 1 was taken using Fujicolor F-11 film, which is available in 20- and 36-exposure rolls.

Kodak Kodacolor 400 Film (Daylight)—Kodacolor 400 is also a C-41 process film, and it has generous exposure latitude. It performs very well under mixed illumination. Kodak states that the film is not designed to be push processed, but it can be home

processed with a Kodak Flexicolor Processing Kit for Process C-41. Kodacolor 400 was used to make photo No. 2 and is available in 20- and 36-exposure rolls.

Note: Both the 3M Company and Sakura (in Japan) have developed ASA 400 color negative films, but they are not yet generally available.

The following are what's currently available in color reversal (slide) films in speeds of ASA 200 and up:

GAF 500 Film—At ASA 500, GAF 500 is the fastest color slide film on the market right now. It can be push processed to E.I. 1000 by sending film exposed at that rating to: GAF Color Film Processing Lab, P.O. Box 8772, Philadelphia, Pennsylvania 19104. You can process or even push process this film yourself with a GAF color slide film processing outfit. Photo No. 3 was taken on GAF 500 rated normally, photo No. 4 on GAF 500 rated at E.I. 1000 (I push processed the film myself with the GAF color slide processing kit). It is available in 20- and 36-exposure rolls.

Note: When GAF 500 is push processed, maximum density (blacks) will become less saturated, and color balance will shift slightly to the red end of the spectrum.

Kodak Ektachrome 200 Film (Daylight)—Ektachrome 200 has better keeping properties and wider exposure latitude than Pro 200. It's a more recent addition to the Kodak process E-6 film lineup and can also be push processed to E.I. 400 with the same processing kit or mailer used for pushing Pro 200 film. Photo No. 5 was shot using Ektachrome 200 rated normally, photo No. 6 with film rated at E.I. 400. The film is available in both 20- and 36-exposure rolls.

Kodak Ektachrome 200 Professional Film (Daylight)—Pro 200 is one of the new process E-6 Kodak films. It can be push processed to E.I. 400 by using the Kodak Ektachrome Film Processing Kit, Process E-6, or by sending film to Kodak in one of their ESP-1 processing mailers. Pro 200 requires careful

storage and prompt processing. Photo No. 7 was taken with Pro 200 film rated normally, photo No. 8 when it was rated at E.I. 400. It is available in 36-exposure rolls.

When shooting with one of the color negative films, you should keep in mind that they are better able to accommodate overexposure than underexposure. Their overexposure latitude is about two f-stops or better, but they can only handle approximately one stop underexposure.

I would rather attempt to print from a thinner negative than try to push the development time; in addition, manufacturers of color negative films do not recommend their being push processed. The names to remember in the negative game are *contrast* and *density*.

Push processing is an important adjunct to low-light color shooting and

1. Fujicolor F-II negative film's latitude is wide enough and speed high enough (ASA 400) to clearly record neon lights at night.
2. Inherent exposure latitude flexibility of color negative film allowed good contrast in this shot taken on Kodak Kodacolor 400 Film (Daylight). Note how warm tones that result from using daylight film with tungsten lighting augment scene's atmosphere.
3. Wide-angle lens distorted staircase, but high speed of GAF 500 color slide film rated normally rendered scene accurately despite low light level.
4. Musician Alton Purnell, sparsely lit by carbon arc light, was photographed from backstage on GAF 500 film pushed to E.I. 1000. (Overleaf)
5. Clarity of shot of tennis pro Rod Laver at an indoor tennis tournament on Kodak Ektachrome 200 Film (Daylight), rated normally, demonstrates that sports action can be shot indoors without pushing film.
6. High contrast, which results from push processing, can be used for dramatic effect, as in this shot taken on Ektachrome 200 film rated at E.I. 400.
7. Delicate, subtle play of light and shadow on subject's face, which was illuminated solely by window light, was caught on Kodak Ektachrome 200 Professional Film rated normally.
8. Using fast shutter speeds and raising film's exposure index make it possible to stop action even at night. Shot taken with Ektachrome 200 Professional film pushed to E.I. 400.

Photos were shot with a Pentax Spotmatic II; 17mm 1/4 SMCT lens used in photo No. 3; 55mm 1/1.8 SMCT lens used in photo No. 7; 85mm 1/1.8 SMCT lens used in photos No. 1, 4, 5, 8; 120mm 1/2.8 SMCT lens used in photo No. 6. Photo No. 2 was taken with an Olympus OM-1 and 28mm 1/3.5 G. Zuiko Auto-W lens.





5



6



7



8

BOLEX



BOLEX PRECISION. Hi-fi quality in Super-8.

You planned this film carefully to make it your best yet. Now you're watching the first screening. If there's the slightest inaccuracy in your camera's synch, running speed, or tone quality, your eyes and ears will instantly detect it. If you film with a Bolex Sound-8, you needn't worry. Its optical, electronic, and mechanical systems blend flawlessly for perfectly synchronized full-fidelity sound and brilliantly sharp images—for sheer magnificent quality, assured by the Bolex heritage of precision.

You'll enjoy the crispness of a Bolex Macrozoom lens with ultra-close focusing capability and electronic thru-the-lens metering. Choose auto or manual sound level control, with rich, clean sound in either mode. Create fades, and monitor all vital camera functions through the brilliant reflex finder. You command accurate, electronically-controlled filming speeds, a built-in intervalometer, electromagnetic release action, and more.

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No matter where you're headed in film, a Bolex Sound-8 will help you get there better, faster, easier. Your Bolex dealer can tell you more. Ask him, today (and check out the new Bolex Sound-8 projectors, too). Or write for Lit/Pak P-76 to Photo Products Division Ehrenreich Photo-Optical Industries, Inc., Woodbury, N.Y. 11797 

BOLEX 5120



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Gravity-feed operation

Slides in a Kodak Carousel projector are never forced, shoved, or free-dropped into place. A precise mechanism—assisted by gravity—lowers each slide into the projection gate. No jarring. No bouncing. It's as dependable as nature. Only gentler.



This is one of the most efficient projection lamps ever devised. The quartz-halogen lamp with an integral dichroic coated reflector means maximum illumination throughout lamp life. Plus brighter, whiter light than conventional lamps provide, and minimum heat. This low heat allows our cooling fan to run at relatively low speed—for whisper-quiet operation.



Automatic focus

The magic of auto-focus lies in a precisely engineered mini-system inside the projector. A light beam is reflected from the slide to a photocell, which tells the motor which way to move the slide for proper focus. By focusing the first slide manually, you give the auto-focus system an example to follow. (Auto-focus is standard on our top five models.)



preheating chamber

As one slide is being projected, the next few in line are being preconditioned by a current of warm air. This causes most "popping" or expansion to occur before the slide gets into the projection gate. It's easier on the slides. And easier on your eyes.



There are eight Kodak Carousel projectors to choose from. See your photo dealer soon for a demonstration.

Kodak Carousel projectors



low-light

can be very helpful when used with care and control in situations where you can't obtain acceptable meter readings any other way. This procedure permits you to shoot with a variety of lenses that would not be usable with the recommended exposure indices of other emulsions. Whether or not to push is a judgment based on your interpretation of the quality of the lighting situation. If you push, you pay the penalties of blocked highlights, diminished shadow detail and increased grain and contrast. When you encounter a contrasty lighting situation and you want to preserve some shadow detail, it would be wiser to make your exposures at the manufacturer's recommended indices, if possible, and forego pushing.

Contemporary high-speed color reversal and negative films provide excellent quality in combination with film speeds high enough to permit shooting in situations that would otherwise have to be passed up. And push processing provides an excellent exposure *alternative* for color reversal film. However, there will be times when the only way you can hope to get anything on film is to shoot at a higher exposure index and then push process. While you may lose some quality, especially in the tonal range and color balance, you will obtain pictures that would otherwise be beyond the scope of either the film's or the lens' speed. You can live with less shadow detail because the essence of the photograph is often worth the sacrifice. Color renditions become even more befuddled and less predictable when the film is push processed, but the risks are part of low-light shooting.

EQUIPMENT

Just three words about filters—*don't use any*. Placing a filter in front of the lens will nullify a fast-lens/fast-film combination and is equivalent to watching TV while wearing sunglasses. Whenever you use a filter, you not only impede resolution to some degree, but you restrict your viewing as well if you're using single-lens-reflex camera. There are some folks, for example, who like to "warm up" the scene with a color correction filter. If you decide to use a filter, be sure to carefully weigh the benefits against loss of speed and resolution.

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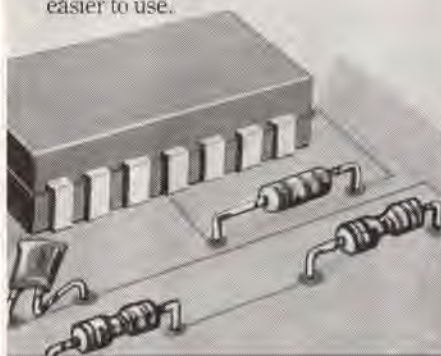
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low-light

Filters are really detrimental if they are laced with scratches, scum and smudges. Save your protective filters for your next shoot at the beach. If you start worrying about excessive color casts or the quality of the light, you will get hung up on color fidelity rather than the atmosphere and mood of dim-light pictures. Sure, you may get caught shooting a spread under fluorescent lights and begin rummaging in your gadget bag for filters. Meanwhile, that once-in-a-lifetime shot is gone!

Get the pictures first. If you have time to experiment and correct, by all means make your shots in various ways. But the serious dim-light worker is primarily concerned with getting the shot. In dim-light shooting, I have learned to tolerate the sometimes-strange colors that result, rather than kid myself that color fidelity might be more important than a usable image in any given dim-light situation.

Low-light photography frequently presents itself apart from the distinct and circumscribed confines of either "daylight" or "tungsten" film designations. Fluorescents, neons, vapor-lamps, high-output tungstens and other lights reflecting from colored surfaces present a psychedelic array that is quite apart from the usual colors "fed" to films.

If you are willing to sacrifice some speed, you can use various colored filters to obtain offbeat colors. Or you can use a filter for color correction; for example, you can induce a warmer tone in a photo by using a magenta or red filter in front of your lens (or if it's a color negative, you can make a magenta adjustment in printing). However, you pay a penalty for introducing that warmer tone, for with a filter factor to add you will lose some of the film speed, which in effect nullifies your choice of a fast film to begin with. I prefer to adjust the print. Either way, you must compromise.

The desire for warmish hues has caused many photographers, including myself, to stick with daylight films for the brunt of their dim-light color work. The fact that daylight emulsions customarily provide warmer color than tungsten film under similar shooting conditions is responsible for this preference.

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low-light work is essential. The only practical test for any lens is the kind of pictures it produces. Certain lenses perform splendidly when stopped down—even a full stop can show a marked difference. Other lenses can't deliver when used wide open. Quality lenses, for the most part, perform well at all apertures. But the characteristics of some lenses enable them to perform better than others at full aperture. Since the underlit nature of dim-light shooting indicates wide apertures, you want to be sure that your lenses can hold their own at these apertures and then utilize those performance capabilities to your advantage. Good contrast is the key to outstanding dim-light color shots. You will get the finest tonal reproduction possible in low-light conditions if your lenses can deliver adequate contrast at the wider apertures.

As for using low-index, fine-grained films to induce better resolution—it's a clumsy practice that necessitates tripod-bracing. The nature of dim-light work is such that it bypasses a fixed-camera position. I don't want to limit myself under such conditions by anchoring my 35mm cameras.

For general photography a lens speed of $f/2$ or $f/2.8$ is ample, as the majority of exposures are made at median apertures near $f/5.6$ and $f/8$. For low-light color shooting the interchangeable 50mm lens with a widest aperture of $f/1.4$ or $f/1.8$ is entirely adequate. Superspeed lenses of the $f/1.1$ - $f/1.2$ class are large, costly and heavy. Lenses in this category are undisputably faster, but when shot wide open, some of them exhibit a discernible lack of definition; center sharpness may be acceptable, yet there is considerable edge falloff.

As for lens hoods, I rarely ever use them for dim-light shooting, unless I suspect that I have a set of lighting conditions that might cause internal lens flare.

In deciding what kind of camera to use for low-light work several advantages of rangefinder cameras over SLRs should be taken into account. The rangefinder camera is quieter; it doesn't have a moving mirror, thus less vibration, and there is no temporary viewfinder blackout. Rangefinder cameras are also usually lighter. The final criteria for camera choice are personal and should take into account the advantages and disadvantages of both types of cameras combined with your own preferences and methods.

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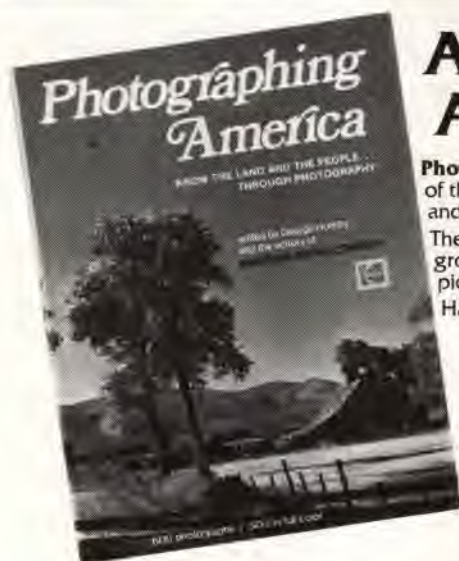
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low-light

SHOOTING TIPS

High speed color-reversal films have slightly less latitude than slower color films; therefore, precise meter readings are very important when you use them. This is especially so when push processing because then latitude is even narrower. The best way to counteract this effect is to bracket your exposures whenever possible—one stop over and under the indicated exposure. You won't always have time to bracket, the nature of dim-light shooting what it is, but it is excellent insurance that you get your shot.

In general, color reversal films have far less latitude than their counterparts in negative material. You may be able to coax some detail out of murky, underexposed transparencies, but a thin, overexposed slide won't yield much of anything. High-contrast subjects will stretch the tenuous latitude to the straining point, while low-contrast subjects will fall more easily into the film's contrast range. Just remember: If you have the time, bracket your exposures!



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The use of slow shutter speeds is the single most important factor in successful low-light color shooting. If you want to consider how significant this factor can be, imagine that when you set your shutter speed one step slower, it is the same as if your old slowpoke f/1.8 lens suddenly became a sizzling f/1.2 (the approximate equivalent of one-stop push processing)!

If you start to think in terms of shooting at slow shutter speeds and finding appropriate lenses for this special use, you'll discover that a wide-angle lens is going to make slow shutter speeds easier to handle. The short focal length of a wide-angle lens reduces camera movement, and you gain in depth of field as well. This optical principle will work in your favor if you use a combination of wide-angle lens and slow shutter speed, and you will also get sharper pictures than if you attempted the same shots with your standard or longer lens.

Using a slow shutter speed in conjunction with a given film's "normal" ASA rating is usually the most satisfactory method of obtaining low-light shots. Push processing might provide higher shutter speeds, but

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low-light

image quality will invariably suffer.

Because of the frequent use of slow shutter speeds, low-light shooting usually requires a very steady camera, and holding the camera and lens steady at slow speeds takes practice. Using the neck strap as a means of steadying one's grip helps. When shooting verticals, I cradle the camera against the inside of my right forearm, pushing the camera body down with my right hand and exerting the same firm pressure upwards with my left hand. Then a light touch on my soft-release accessory, and very slow speeds are possible. On horizontal shots I loop the neck strap around my right hand and take up the excess slack until the strap is quite taut, then I press forward on the camera body until it is very firmly positioned.

Bracing your camera is a very effective way to facilitate shooting at slow shutter speeds. I use any handy support—table, wall, railing, whatever. The main secret is to *relax* and hold your camera firmly; all you add to that is a very tender touch on your shutter release.

Subject movement can best be dealt with by anticipating what the subject is going to do. There is a moment when your subjects will almost "freeze" in the middle of their activities; e.g., a performer will pause for an instant in the midst of the most energetic activity, or a toddler at play will stop at various times to contemplate something around him/her in fascination. These are the moments to shoot!

Although any lens is difficult to focus in dim-light situations, wide-angle lenses allow you to circumvent this problem to a certain extent because of their comparatively great depth of field. According to the old adage, "The shorter the focal length, the more you have in focus"; add to that, "The shorter the focal length, the less movement will be recorded on film at slower speeds." Don't condemn your lens if you haven't given it a fair chance. The crispest lens can look like a lemon if you fail to set your focus correctly. By becoming increasingly familiar with your distance scale, you can neutralize some of your focusing errors. If you use an ultrawide-angle lens, don't worry about exact focusing; just adjust the distance scale by estimating the distance, and the focus

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will take care of itself.

As a further focusing aid, always carry a handy penlight with you. It will be a big help in setting your camera's controls in extremely dim-lit situations.

A LAST RESORT

Let's suppose that you have used a fast lens, a high-speed film and a slow shutter speed, and the results still yield an underexposed slide. Don't despair—there's still a way to salvage the shot. This final revitalization is provided by corrective duplication. The process has been erroneously referred to as post-processed pushing. Since it is not possible to add what is not inherent in the slide by ordinary push processing or any other means, what you can do is to give an underexposed slide additional brilliance and contrast by according more exposure to it during duplication than a normal dupe would require and by copying the original onto a contrasty duplicating film (just as you would print a thin negative on a contrasty paper).

This is a tricky operation, but the results are well worth the extra effort. Kodak has recently introduced the new process E-6 Ektachrome Slide Duplicating Film, 5071, which I have not yet tested. But I have obtained good results with Kodak's process E-6 Ektachrome 50 Professional Film (Tungsten) used as a duplicating film. The major problem in this process is deciding how much additional exposure the underexposed slide requires compared to a normal one. The solution can best be arrived at by bracketing the duping exposure time.

Bleaching is yet another way of adding sparkle to lackluster slides. A commercial film bleach will brighten slides dipped in it and can counteract the effects of a full stop underexposure.

There is no clear-cut definition between interior and exterior dim-light subjects, nor any rules that say you can't help your dim-light shots by using a reflector or even assist yourself with a dash of bounce-flash. These methods might be frowned on by old-line practitioners of the craft, but I believe whatever means are used to obtain your photographs are perfectly acceptable.

Low-light shooting is a very special branch of photographic art and a challenging and creative area for any photographer. By taking advantage of the almost abstract quality of the light and muted tones that seem to flow together in low-light shots, you can produce memorable works of art. □



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"I believe in my instincts and not my head," she emphasizes. "To think things out too much is usually a disadvantage. However, the combination of instincts and ideas works very well photographically." Griffiths is open to bringing her feelings into the photo session. She responds to the environment whether she is shooting in her studio or on location. This syntonetic relationship to her work is evident in the photographs on these pages. An emotional equilibrium is the pervasive feeling that distinguishes every image. □

Griffiths, a young professional currently working in Los Angeles, used Nikkormat or Nikon F camera with motor drive and 35mm and 50mm Nikkor lenses to shoot the photographs in this portfolio. All photos were exposed on Kodak Plus-X Film and printed on Kodak Polycontrast F paper; exposures were not recorded.







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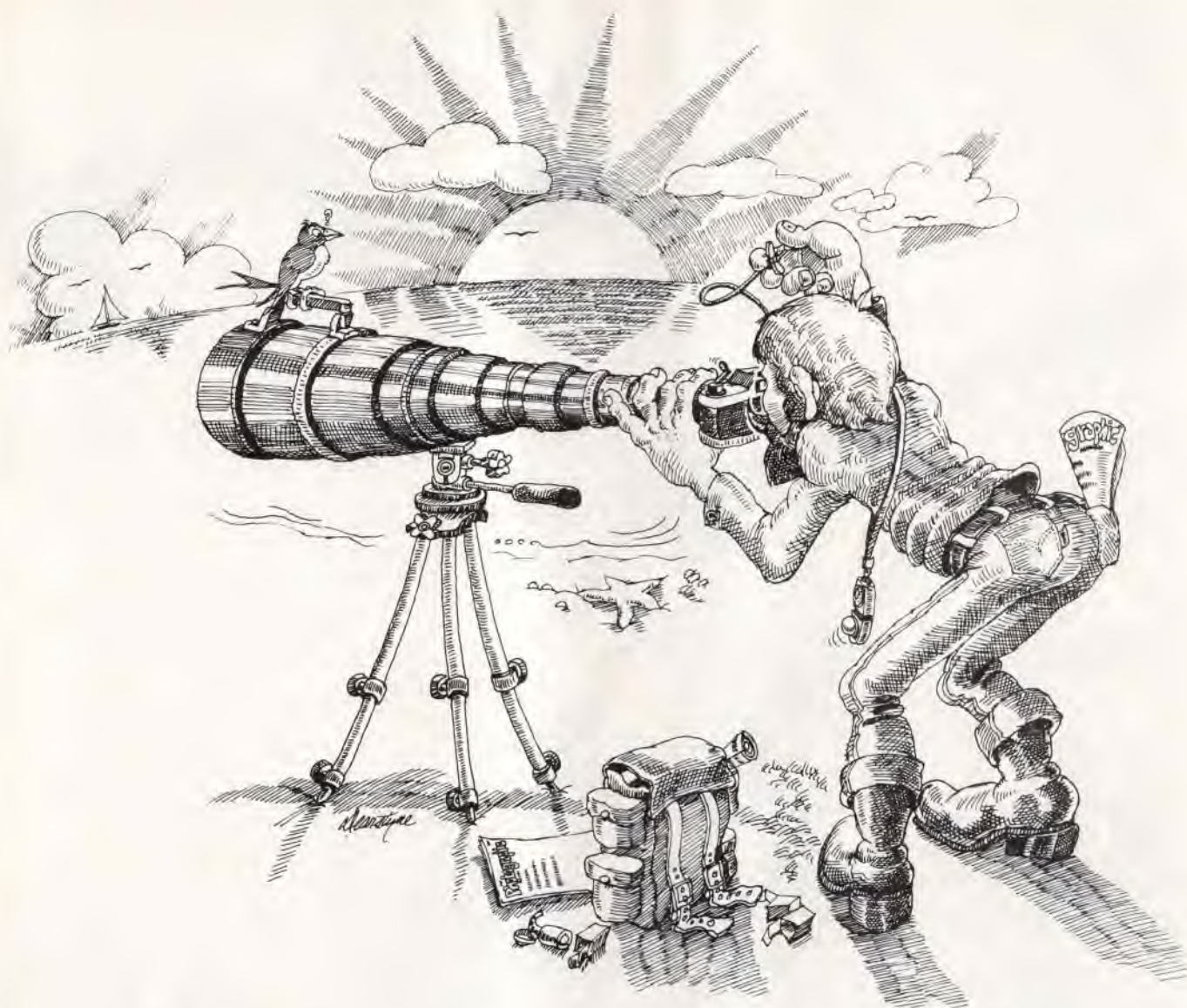
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by john wimberley

When someone mentions print quality, what comes to mind? Do you think of sharpness, unobtrusive grain and a full range of tones from deep black to pure white? These three factors are the most discussed criteria of print quality, but there is one more—the relative distribution of tones of the gray scale.

Imagine a print made from a negative of a full-range subject. The values of the middle gray tones are what give the picture much of its feeling of "reality." Or, as they say in the record industry, "presence." The problem is that all too often when the shadows and midtones are pleasing and of sufficient contrast, the very bright areas are blank white, and if you print darker to get highlight detail, then the midtones are too dark. Of course, one may burn-in highlights, but that is more work and usually difficult to repeat exactly from one print to the next. A preferable method is to develop the film in such a manner as to equalize contrast.

CONTRAST CONTROL

Some film developers are formulated to do just that. These are called compensating developers. They cause the heavily exposed areas of the negative to develop proportionately less than the shadows and midtones. Normally, they accomplish this by being very diluted or of low chemical activity. The highlights exhaust the developer present in the emulsion faster than it can be replaced by agitation and diffusion, slowing the rate of development in these areas while it is proceeding normally in the shadows or lightly exposed areas. Compensating developers produce negatives with better shadow detail and a more lively midtonality without blocked-up highlights; however, they do cause some loss of contrast in the highlight areas, thereby reducing brilliance.

Another way to obtain a fully printable scale in film development is to use one of the tanning developers, pyrocatechin or pyrogallol. I'll discuss the use of pyrogallol here, which is usually called pyro, sometimes pyrogallic acid. Its chemical name is 1,2,3-trihydroxybenzene. It may well lay claim to being the finest developing

1. Though photograph was taken directly into a brilliant, hazy sun, there is no discernible flare in print because pyro develops primarily on film's surface, minimizing light scatter within emulsion. Photo taken with a 50mm f/4 Distagon lens and Ilford Pan-F Film.

2. Fine detail evident in tree's lower, shadowed branches demonstrates sharpness and rich tonality made possible by pyro film developers. Agfa Agfapan 25 Film and 250mm f/5.6 Sonnar lens used to make photo.

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pyrotechnics

agent in virtually every respect. But pyrogallol must be handled correctly to derive its full benefits. I've been using pyro for a number of years and find it produces results unobtainable with any other developer. With modern roll and sheet films, such as Ilford Pan F or Kodak Plus-X, pyro yields fine translucent tonalities and enhances sharpness considerably; while 35mm fast films (Kodak Tri-X and Ilford HP4) may be too grainy by some standards.

BACKGROUND DATA

Pyro was the first organic developing agent discovered, the honors going to a man named Regnault in 1851. By contrast, hydroquinone was introduced in 1880, metol in 1891. Pyro was very popular well into the 20th century and is still used by a few people interested in the finest tonal quality obtainable. Edward Weston used it for all his work from the early 1920s until 1948 when he ceased to photograph. His exquisite prints reflect his vision and its appropriate technique, as well as the efficacy of pyro. Strangely enough, pyro's popularity declined indirectly as

1. & 2. Film's ASA was doubled and +1 developer dilution used to increase contrast. Pan-F film was used to make both photos; photo No. 1 taken using a 120mm f/5.6 S-Planar lens and a 50mm f/4 Distagon lens used in photo No. 2.

a result of the introduction of the photoelectric light meter.

In the days before reliable meters many films had two emulsion coatings. First, one of high sensitivity; beneath that, one of low sensitivity. This allowed great exposure latitude, which was necessary, as exposures were often guesses. The film was tray-developed by inspection with the photographer checking the progress of development by safelight. When optimum development was reached, he/she removed the film and put it in the stop bath, allowing him/her to correct for various exposure levels by varying the development time for individual negatives.

With the introduction of light meters time/temperature development came into vogue. Negatives could now be consistently exposed and developed for predetermined times to achieve predictable results. At this point, pyro was found by many photographers to give negatives of differing quality from one day to the next. The problem

arose from two sources, the instability of sodium sulfite in solution and attempting to reuse what must be strictly a one-shot developer.

Graded black-and-white printing paper is sensitive to blue light. Consider what would happen if your negatives had an orange-colored image with the depth of color proportional to the silver density. This would allow you to develop very "thin" negatives because the orange cast would act on the printing paper exactly as an orange filter on a camera affects the image of a blue sky by darkening it. The negatives would look flat to the eye but would print on normal contrast paper because the orange color would add density to the silver image as seen by the blue-sensitive paper. Such a negative would have the advantages of less density, higher sharpness and finer grain, without the disadvantage of your having to print it on high contrast paper with its limited exposure latitude.

This is exactly what pyrogallol does. The oxidation byproducts of pyro stain the silver grains a deep brownish orange. The ratio of silver density to the effective stain density is called the *color coefficient*, which may be as high as 2. These oxidation byproducts, which are formed during development, also tan—harden—the gelatin emulsion. In fact, negatives developed in pyro are far more scratch resistant than those from conventional developers. This hardening effect also accounts for much of pyro's compensating action. As the film develops, highlights are hardened more than shadows, restricting access of fresh developer to the emulsion. Tanning has another beneficial effect: It keeps the developer on the surface of the emulsion, increasing sharpness, particularly in the highlights where it's most needed, by reducing the effects of light scatter in the emulsion and resultant halation. Pyro also produces pronounced adjacency effects and Mackie lines, which further enhance the impression of sharpness.

You should experience no difficulty printing pyro-developed negatives on variable-contrast paper. The color of the pyro stain approximates the No. 1 Polycontrast filter; thus when printing on variable contrast paper with no filter the contrast is somewhat less than normal. However, the results when using the filters match those from non-pyro negatives, and the exposure compensation for the various filters in the Kodak Polycontrast exposure calculator are not changed.

The lens is usually the weakest link in the enlarging chain. An EL Nikkor lens is the strongest.

Even the most expensive enlarger can't give you top quality prints unless it's equipped with a top quality lens. And, you can't buy a better enlarging lens than EL Nikkor.

On the other hand, even an inexpensive enlarger will produce better prints when you put an EL Nikkor on it. And, you can afford it, because EL Nikkors cost no more than other, reputable enlarging lenses.

Unlike others, however, EL Nikkor lenses are made from Nikon optical glass and designed for superlative definition, flatness of field, and color correction extending into the invisible ultraviolet spectrum to which enlarging papers are highly sensitive. They exhibit no focus shift when stopped down (which is fast and accurate, even in the dark, with their large, white aperture markings and positive click stops). Focal lengths range from a fast 50mm f2.8 to 360mm, covering formats from 35mm to 11x14 with edge-to-edge brilliance.

No matter what enlarger you have, it will do its best work with an EL Nikkor lens. Let your Nikon dealer help you choose the right one for you. Or write for Lit/Pak N-15, Nikon Inc., Garden City, N.Y. 11530.  Subsidiary of Ehrenreich Photo-Optical Industries, Inc. (In Canada: Anglophoto Ltd. P.Q.)





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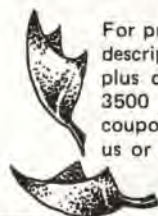
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pyrotechnics

PYRO SOLUTIONS

Chart No. 1 is the classic Kodak D1 formula. (Note the "D1"—evidence of its age!) There are three stock solutions. "Solution A" contains sodium bisulfite, added first to the water to insure an acid environment for the pyro, as the pyro will immediately start oxidizing if the water is alkaline. Potassium bromide prevents fog but is not really necessary, as pyro's oxidation products are antifoggants.

"Solution B" contains sodium sulfite, which is used as a preservative to control oxidation rate. It also converts some oxidation byproducts to colorless compounds, limiting staining. Sodium carbonate in "Solution C" is the alkali. All organic developing agents, except amidol, require some degree of alkalinity to work. That is why this developer is in separate stock solutions. It oxidizes so quickly when mixed that the alkali must not be added to the pyro until immediately before use. Pyro is quite sensitive to the quantity of alkali; therefore, it should be measured with care.

Chart No. 2 gives the formula of "Pyro-Metol Developer WD2D," the result of my own research. It overcomes the problem of inconsistent negatives by eliminating "Solution B" of sodium sulfite, which is unstable in solution with water and changes to sodium sulfate in a week or two. Sodium sulfate is an effective emulsion hardener but not a preservative. In "WD2D," sodium sulfite is present only when the two stock solutions are mixed together for use: It is produced by the combination of sodium bisulfite and sodium carbonate. "WD2D" stock solutions are quite stable and last in partially filled amber glass bottles for about six months.

Another major change in the "WD2D" formula is the addition of the developing agent metol (Kodak Elon). It produces a super-additive or synergistic mixture; that is, the development rate of the pyro/metol combination is faster than the sum of their individual rates. Metol also raises the effective speed and provides better shadow detail. There is so little metol in this formula that after activating the exposed grains, it exhausts, leaving the silver halide grains accessible to the pyro, which continues development. This sacrifices none of the advantages of pyro, while still taking advantage of metol's characteristics.

The metol must be dissolved before the sodium bisulfite, as metol won't dissolve in an acid solution. "Solution B" now contains the antifoggant, Kodak Anti-Fog No. 1, also called benzotriazole. Combining it with the alkali keeps the proportion of antifoggant to chemical activity constant when the amount of alkali is varied to control contrast. In Chart No. 2, the +1, +2 designations refer to the steps of the Zone System for those workers; for everyone else, the difference in contrast is about one paper grade per step. The developing time may be changed to control contrast, as with conventional developers, but the preferred method with pyro is to adjust the quantity of stock "Solution B."

HELPFUL TIPS

When mixing pyro, as with any developer, cleanliness is imperative. Use of distilled water is best, although in most areas tap water is sufficiently pure. Pyro is poisonous, though not lethal in small amounts. Keep it and all chemicals out of the reach of children.

Developing times are given in the accompanying instructions for a variety of roll and sheet films. They may have to be adjusted slightly to suit individual taste and equipment.

Pyrogallol may be obtained through chemical supply houses, such as the Van Waters & Rogers chain (check your local *Yellow Pages*) or distributors of Eastman organic chemicals. Pyro can also be purchased by mail from the Student Science Service, 622 West Colorado Blvd., Glendale, California 91204.

The purified grade is suitable for photographic use, or you can use reagent grade, which is extremely pure, but there seems to be no particular advantage to offset the higher cost. All other chemicals are manufactured by Kodak and are available through any camera store, though some may have to be specially ordered. They are also obtainable from Lauder Photographic Chemicals, 350 Peninsula Avenue, San Mateo, California 94401.

When mixing the stock solutions with water for use, try to stir as little air as possible into the mixture, use immediately, then discard. A household bleach such as Clorox will easily remove any stains that may appear on sink or fingers. When developing roll film in tanks, I recommend first filling the tank with developer, then inserting the loaded reel in the dark. Agitate for the first minute, then for 15 seconds.

out of every 30 by rolling the tank back and forth on a smooth surface for about 10 seconds, then invert twice. This procedure results in extremely uniform negatives. The color drum motor bases should serve this purpose.

If you are tray-processing sheet film, agitate continuously by alternately raising each side of the tray in sequence. When you place the developed film in the stop bath, you are in for a surprise—it will light up for a few seconds. This phenomenon is known as *chemoluminescence*, and it causes no harm. It is more pronounced with higher alkalinity, such as levels in

the +2 or +3 mixtures.

The use of plain hypo is advised, as the tanning effect of the developer eliminates the need for a hardener, and rapid fixers tend to bleach out the stain image. Plain hypo can be made up using 240 grams of sodium thiosulfate and water to make 1000ml of solution.

Pyro is a very unique film developer capable of extraordinary results. But it must, like a rare and fragile statue, be handled with care and respect. If you are after the *ultimate* in print quality, pyro may be just the answer for you—it was for Edward Weston! □

1. THREE-SOLUTION PYRO DEVELOPER KODAK D1

Stock Solution A

Sodium bisulfite	9.8g	140 grs.
Pyro	60g	2 ozs.
Potassium bromide	1.1g	16 grs.
Water to make:	1000ml	32 ozs.

Stock Solution B

Water	1000ml	32 ozs.
Sodium sulfite	105g	3½ ozs.

Stock solution C

Water	1000ml	32 ozs.
Sodium carbonate	75g	2½ ozs.

Example of classic ABC pyro formula in use during the late 19th and early 20th century.

2. PYRO-METOL FILM DEVELOPER WD2D

Stock Solution A

Water at 40°C. (100°F.)	400ml	14 ozs.
Metol (Kodak Elon)	1.5g	26 grs.
Sodium bisulfite, anhydrous	5g	78 grs.
Pyrogallol	15g	265 grs.
Water to make:	500ml	16 ozs.

Stock Solution B

Water	400ml	14 ozs.
Sodium carbonate, monohydrated	20g	310 grs.
Benzotriazole, 1-percent solution (Kodak Antifog No. 1)	2ml	1/10 oz.
Water to make:	500ml	16 ozs.

To use:

For roll and 35mm film in 450ml (16-oz.) tanks:

Contrast (see text)	Water	A Stock	B Stock
-1	400ml	20ml	18ml
Normal	400ml	20ml	20ml
+1	400ml	20ml	22ml

Developing times at 20°C. (68°F.)

Pan-X ASA 50	9 min.	Pan F ASA 40	9½ min.
Plus-X ASA 125	8½ min.	FP4 ASA 125	8 min.
Tri-X ASA 400	8 min.	HP4 ASA 400	8½ min.

For sheet film in 5 × 7 trays:

Contrast (see text)	Water	A Stock	B Stock
-1	300ml	20ml	18ml
Normal	300ml	20ml	20ml
+1	300ml	20ml	22ml
+2	300ml	20ml	25ml

Developing times at 20°C. (68°F.)

Plus-X ASA 125	8 min.	FP4 ASA 125	7½ min.
Tri-X ASA 320	7½ min.	HP4 ASA 400	8 min.

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GALLERY 77

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1. Giant molar seems to be following this child home in Roman Menendez' unusual photograph. Shot recorded with Olympus OM-1 and 35mm Zuiko lens. Kodak Tri-X film exposed through green filter for 1/500 at f/16.

2. John J. Fontecchio's unusual graphic was made by copying original Kodak Ektachrome-X transparency onto Kodak Kodalith Pan film and then printing image four separate times on a single sheet of enlarging paper. Original exposure made with Canon FTb and Vivitar 85-205mm zoom lens; exposure unrecorded.

3. Delicate use of available light helps create a sense of mystery in Wally Read's gently compelling portrait. Scene photographed with Minolta SR-T101, 58mm MC Rokkor lens and Soligor 2X teleconverter. Tri-X film was exposed for 1/15 at f/3.5.

4. Joel Riegan carefully employed subtle back-lighting and partial overexposure to achieve this delicate high-key portrait. Shot made with Minolta SR-T201 and 58mm f/1.2 MC Rokkor-X lens on Kodak Plus-X film for 1/250 at f/5.6.

5. Junior motocrosser gets a feeling for accelerated living in John Allen's photograph of his son. Shot documented with Canon FTb, Vivitar 135mm f/2.8 lens on Tri-X film for 1/500 at f/11.



1



2



3



COLOR GALLERY 77

1. Dennis Darmek photographed this amorphous being in a watery grave using Kodak Ektachrome Infrared Film exposed for 1/125 at f/4. Photo made with Pentax K1000 and 20mm f/4 SMCP lens.
2. In 30 feet of water William Abramsohn captured this monochromatic image of a dormant red urn sponge. Photo made with Nikonos II, 35mm f/2.5 Nikkor IC lens and 3:1 close-up lens; illumination from a Subsea Mark 100 underwater strobe. Shot taken on Kodak Kodachrome 64 Film; exposure unrecorded.
3. Eric Saylor employed dynamic framing to accent his fluid composition of Hawaiian fishermen. Photo recorded on Kodak Ektachrome-X Film with Canon F-1 and 300mm f/5.6 Canon lens; exposure unrecorded.
4. Hawaiian sunshine gracefully silhouettes diver in Scott Dollmeyer's dreamlike photograph. Photo made with Nikonos II, 28mm f/3.5 UW Nikkor lens on Kodak Kodachrome 25 Film exposed for 1/60 at f/22.
5. Combination of soft backlighting and careful cropping enhances John Nemeth's elegant composition. Shot made with Minox SR-T202 and 35mm f/2.8 MC Rokkor lens on Agfa Agfachrome 64 Film; exposure unrecorded.



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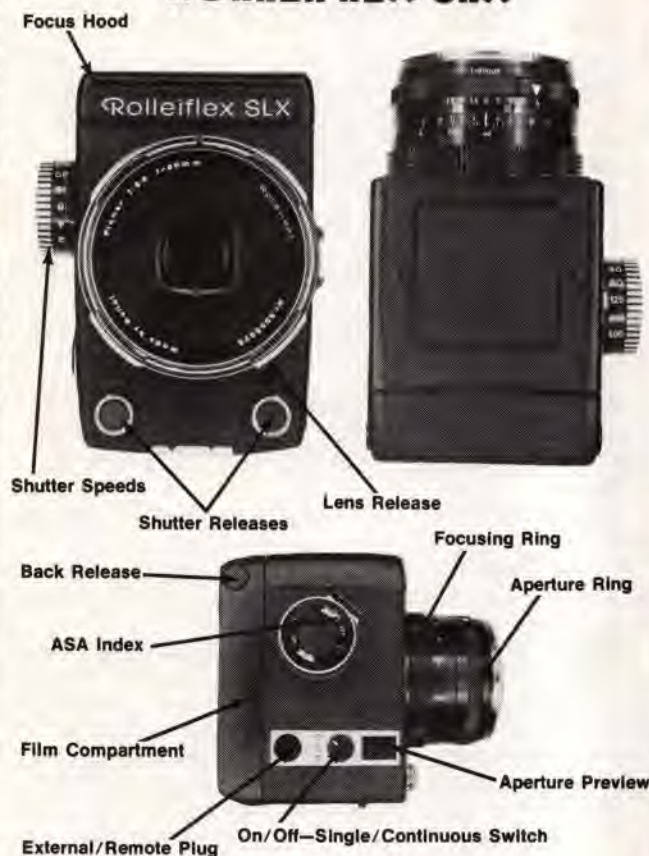


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Photographic's SPEC SHEET

ROLLEIFLEX SLX



TYPE: 120/220 single-lens reflex with 6 × 6cm format (2 1/4 × 2 1/4)

LENS MOUNT: Rollei bayonet

SIZE: 4 3/32" long × 5 7/16" high × 4 5/16" deep (104mm × 138mm × 110mm) (body only)

WEIGHT: 44 ozs. (1250g) (body only)

BASIC PACKAGE: Camera body, normal lens, battery, battery charger and cord, front and rear lens cap, body cap, remote shutter release and neck strap

PRICE: \$2650

DISTRIBUTOR: Ehrenreich Photo-Optical Industries, Inc., 101 Crossways Park West, Woodbury, New York 11797

FEATURES

Viewfinder: Through-the-lens focusing with waist-level folding hood with magnifier standard. Interchangeable focusing screens with combination split-image and micropism collar standard. 45° pentaprism and rigid magnifying finders available. Red LEDs for over- and underexposure levels to right of screen.

Shutter: Between-the-lens leaf shutter that has electronically controlled and electrically actuated speeds from 30 seconds to 1/500 second plus bulb. Automatic diaphragm is electrically actuated from camera body control center.

Mirror: Instant-return type with prerelease capability when remote shutter release is used.

Automation: Fully automatic operation of shutter-priority type. Aperture preview key actuates auto-diaphragm, which closes aperture to meter setting. F-stop can be read directly on scale on lens barrel.

Exposure Meter: Through-the-lens metering using three silicon color-corrected cells located behind reflex mirror. Averaged, reflected center-weighted readings. ASA range 25-6400.

Frame Counter: Automatic resetting, additive exposure counter. Control switch for change from 12-exposure 120 roll to 24-exposure 220 roll on back of camera.

Film Advance: Integral, automatic, electric motor film advance. Motor automatically advances film to first exposure mark after fresh roll is inserted. Either single or continuous firing with 1.6-frame-per-second rate. Motor winds film to end of roll automatically at end of last exposure.

Flash Synchronization: X synchronization provided at all shutter speeds. PC terminal is located on camera body and has the Rollei cord locking feature. Standard PC cords may be used without locking feature.

Accessory Shoe: X-synchronized hot shoe provided on side of camera.

Self-Timer: None

Battery: Removable battery unit supplied with camera has eight canted nickel-cadmium 1.2-volt batteries and an M1A fuse. Battery charger provided with camera with voltage adjustment for all common household sources. Ten- to 15-minutes' charge will provide about 100 exposures. Total full charge requires three hours and provides 1000 exposures.

Battery Check: Red LED in viewfinder will go on when aperture preview pressed with battery below working level. Camera operation automatically switches off when not enough power.

Lenses Available: Six accessory lenses are offered including a 40mm f/4 wide-angle, 50mm f/4 wide-angle, 120mm f/5.6 telephoto, 150mm f/4 telephoto, 250mm f/5.6 telephoto and 350mm f/5.6 telephoto.

Accessories: In addition to accessories already mentioned are color filters, soft-focus filters, lens hood, professional lens shade, spare battery packs, pistol grip, quick-focus lever, extension bellows, Polaroid back, cable releases, extension tubes and an operating manual.

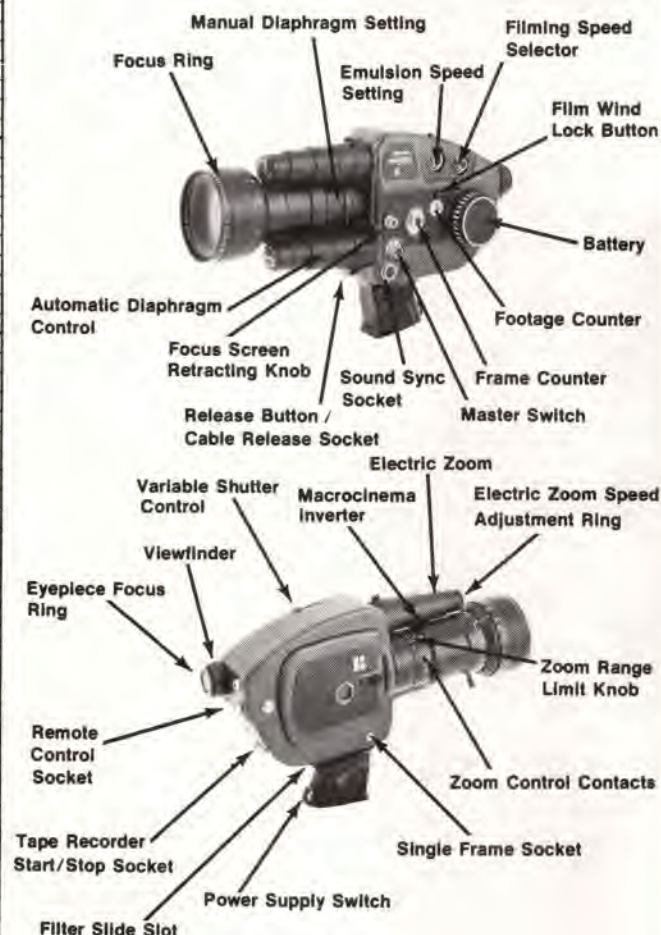
COMMENTS

The SLX is designed for the greatest ease of use without any loss of function. The intricacies of function and the many controls usual on professional 2 1/4 SLR cameras have been replaced by electronic automation, while all manual options needed (multiple exposure, manual exposure control, premirror release and aperture/depth-of-field preview) are easily accessible. Film changing is the simplest and easiest of all, and there are no reverse curves over which the film has to travel.

Although the SLX is rather heavy and large, the shape, control placement and balance make it very easy to handle. Noise usual for a motor driven SLR is at a minimum. The \$2650 price may seem like a high figure, but counting up the built-in features and functions that are additional options purchased separately on other cameras it is a reasonable cost for Rollei quality.

Photographic's SPEC SHEET

BEAULIEU 4008 ZM 4 SUPER 8 MOVIE CAMERA



TYPE: Super 8 movie camera

LENS: Schneider f/1.4, 6-70mm (12:1 zoom) with macro. Power zoom speed variable between 2 to 12 seconds with manual override. Focusing to 37 inches normally, to lens surface in macro mode. C-mount lens interchangeability.

SIZE: 11½" long x 2 4/5" wide x 7" high (29cm x 7cm x 17cm) (including lens)

WEIGHT: 2 lbs. (.9 kg) without lens; 4 lbs. (1.8 kg) with Schneider zoom

BASIC PACKAGE: Camera body and lens, lens cap, lens hood, eyecup, 30 mA 7.2-volt battery charger, wall socket adapter plug, filter key, detachable wrist strap and instruction manual

PRICE: \$1600

DISTRIBUTOR: Bell & Howell/Mamiya Company, 7100 McCormick Road, Chicago, Illinois 60645

FEATURES

Viewfinder: Single-lens reflex with built-in eyepiece adjustment ± 2 diopters. Through-the-lens focusing with retractable divided-grain focusing screen. An indicator inside the viewfinder flickers to indicate the film is advancing; meter needle allows for correct exposure check.

Exposure System: Automatic, through-the-lens EE meter system with full manual override possible. Photocell can be adjusted according to sensitivity of emulsion used for ASA range 10-400.

Filming Speeds: Variable from 1 to 80 frames per second.

Footage Counter: Indicates amount of film remaining in cartridge, graduated in meters and feet; automatic resetting capability. Adjustable frame counter index from 0 to 100.

Battery: Nickel cadmium rechargeable battery (250 mA, 7.2V). Three-position trigger switch activates power supply.

Battery Check: Set master-switch button to "test," then push in power switch, and pointer in viewfinder will settle above the index notch within 20 seconds if battery is okay.

Conversion Filter: Built-in Wratten 85 filter, retractable with flat key.

Sound System: Recording sound is possible on separate tape recorder (double system) with sync generator accessory.

Additional Features: Variable shutter allows fade-ins, fade-outs and lip-resolves; quick-focusing system works by rotating lens focus ring until image on screen is in perfect focus. (Adjustment must be made at maximum aperture and "telephoto" position, then any focal lengths can be used without having to adjust focus.) Remote-control capability with two-strand line and jack plug or radio control device.

Accessories: Camera cases, cable releases, remote-control cable, many filters, portrait lenses, reverse wind device (for reverse filming, superimpositions and lap-dissolves), synchropilot generator, contact switch, 250 mA accumulator battery, independent charging box container, connecting cords, mount adapter rings for using 35mm photo lenses.

COMMENTS

Beaulieu, the French company, has been making very sophisticated movie cameras for over 20 years. Their product line is often said to be the Rolls Royce of movie cameras. All Beaulieu super 8 models have reflex viewing with a mirror shutter, an automatic iris diaphragm, very luminous high performance lenses and long-duration battery power. The 4008 ZM is fully automated and is as simple to use as the most basic cameras. But with its highly sophisticated features, you can find new ways to express cinematic ideas from the moment you begin to film. Beaulieu cameras are among the very few super 8 models with interchangeable lenses. This is possible because the viewing system is part of the camera and thus independent from the lens. Beaulieu super 8s will take 35mm single-lens reflex lenses with an adapter ring and all 16mm C-mount lenses.

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15 minutes in external
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tolerance of 1/4 f-stop.

Vivitar 283.
Guide Number
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25 film. Auto
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lenses at pre-
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Model 273 flash requires a
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SPECIFICATIONS:

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DARKROOM WATER-SAVING TIPS

WAYS TO SURVIVE WATER RATIONING WITHOUT GIVING UP YOUR HOBBY

BY PARRY C. YOB

With some Pacific Coast communities well into their second year of water rationing and a far less than normal snow pack in the headwaters of every great river system west of the Mississippi, the American darkroom is in trouble. The drought that now reaches from Wisconsin to California could last as long as the 12-year dry spell between 1927 and 1939, but even if it is shorter, three years of heavy rainfall will be required to substantially soak the ground and provide adequate runoff from the river basins. If you live in the eastern United States, the increased cost of power to pump your water and the fuel you use to heat it will soon make you appreciate a few water-saving tips along with your hard-hit western friends.

To cut darkroom water consumption you have to find ways of eliminating waste, make more efficient use of what is available and in some cases save water for reuse in some less demanding function. This article will provide you with a chemical test by which you can quickly and simply determine the efficiency of any print washing system. In fact, I will encourage you to make tests to determine whether or not the suggestions I make here will actually save water when compared with the methods you now use.

HOME RATIONING METHODS

Since most water rationing systems limit the consumer to fixed number of gallons per day and impose penalties for exceeding the limit, the home darkroom worker must also consider ways of saving water around the house.

Therefore, let's review a couple of household misconceptions that could have you wasting water when you are trying to save it.

There is some confusion as to whether a tub or a shower uses more water. Actual tests show that a normal length shower uses far less water than a tub bath, but there is a catch to both. If you let the water run to warm up before you enter either, that water is wasted. Catch the warm-up water in a bucket and use it later to flush the toilet. To flush a toilet with a bucket of water simply pour the water into the bowl as fast as it will take it. A three-gallon bucket of water will do a good job most of the time. Okay, you've just saved the warm-up water, but with a little more thought you could have saved twice as much, and here's how.

After collecting the warm-up water in a bucket instead of letting it run down the drain, you could have used it for washing either negatives or prints, caught it again in a second bucket, then used it to flush the toilet. That way, you would have made double use of the water you'd normally have wasted.

Having saved warm-up water in the bathroom and the kitchen, don't forget the darkroom. Warm-up water should be saved while you are letting the tap run to reach chemical mixing or processing temperatures. It can be reused twice to cut either darkroom or domestic water consumption or both. If you are mixing up a quart bottle of developer and the instructions tell you to use 24 ounces of water at 125°F. to start with, don't run out 10 or 15 gal-

lons of water to warm up the pipes to get the tap temperature to 125°F. Instead, put a quart of water in a pan on the stove and heat it up. The energy consumed by the use of a stove or hot plate is far less than the energy soaked up in heating the pipes, running the water heater and running the city water supply pumps to move that 10 or 15 gallons of warm-up water.

HANDY STORAGE DEVICES

If you do color processing and are using a temperature control valve to feed heated water to your sink so you can maintain a 100°-plus temperature for your solutions, you are wasting huge amounts of both water and energy. I've stopped using my valve for the duration of the water shortage and replaced it with a Model 14-9 constant-temperature bath from Photo-Therm, 110 Sewell Ave., Trenton, New Jersey 08610. This unit, shown in photo No. 4, recirculates the warm water, saving both water and energy, whereas my old system with the temperature control valve wasted several gallons of water every minute and kept my water heater running constantly during color printing sessions.

The Photo-Therm bath offers the added advantage of maintaining the bath temperature within 1° for days at a time, while my valve was hard pressed to stay within 1° for more than an hour. If you need a larger unit, component parts are available from Photo-Therm, and a precision temperature controller for recirculating sinks, etc., called the SuperTemp®, is available from G&G Products, Inc., 5436



2

1. Symbol for water conservation efforts. ©Parry C. Yob

2. Water siphoned from a jug has constant temperature with more than adequate volume. Controlled temperature cabinet also shown here.

3. "Egg crate" plastic, from a plastic supply house, provides means to pass wash water directly into a bucket to be saved for toilet, garden or other use.

4. Photo-Therm bath saves both water and energy and is more accurate than any temperature control valve.

5. A storage unit made from a large plastic wastebasket will hold saved or salvaged water as long as you don't attempt to move the full container.

6. Make up concentrated hypo clearing agent and dilute for use to reduce wash times and wasted water for both negatives and prints.

7. Use throwaway test strips and don't waste water washing your rejects and failures when water is scarce.

8. Hypo test solution (formula given in text) will tell you how efficient your washing is and perhaps tell you how good your favorite print washer really is.

9. When no water can be spared, stabilization processing will still keep you in business.

4



3



VIVITAR 75-205MM CLOSE FOCUSING ZOOM LENS

How many great shots have you missed because you didn't have the right lens on your camera? Or because the action didn't wait for you while you changed lenses? Or because you couldn't move forward or back to compose the picture with a fixed focal length lens?

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Specifications: Focal length: 75-205mm. Aperture range: f3.8 to f22. Optical construction: 15 elements, 10 groups. Angle of acceptance: 32° at 75mm to 12° at 205mm. Weight: 787 gms. (28 oz.). Length: 153mm (6 in.). Diameter: 67mm (2.6 in.). Accessory size: 58mm. Lens coating: MC (multi-coated). Close focus: zoom 2M (6.5 ft.). Minimum focusing distance from film plane: 42.5 cm (16.7 in.). Maximum reproduction ratio: 1:3.8.

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DARKROOM WATER- SAVING TIPS

Woodland Ave., Western Springs, Illinois 60558. Either the Photo-Therm components or the SuperTemp® could be used to control commercial processing equipment.

Another way to save both water and energy is to store the water you've saved in a clean, five-gallon polyethylene jug and keep it in a warm place until ready for film washing. I keep mine in a temperature-controlled cabinet which is regulated by a thermostat and heated with a 100-watt light bulb. Details for construction can be found in Petersen's guide to *Photo Equipment You Can Make*.

Photo No. 2 shows the simple method of using a siphon hose to draw water from the big jug, while photo No. 3 shows a good way of collecting wash water for use in flushing or gardening. A piece of "egg crate" plastic allows the film tank wash water to drain directly into a bucket for easy transfer.

I also temporarily store wash water in tank illustrated in photo No. 5. This was originally made from a large, plastic wastebasket, which I used for mixing large batches of chemicals, but now I find I can also use it to store water that was used to wash negatives. This water can be used as a prerinse to flush hypo from prints before putting them into the hypo clearing agent or put into a garden sprinkling can for use in watering outdoor plants.

Except for the water from first rinses following the fixing bath, most photographic wash water from black-and-white processing, including print washing, is safe for use in watering outdoor plants. The actual chemical content of this water is not very high, and since it is mostly thiosulfates, sulfites and is slightly acid, the sulfur in these small quantities could actually be beneficial to some plants.

PRINT-WASHING CONSERVATION

What comes next is going to be controversial, but I will offer scientific evidence as proof rather than wishful thinking. The largest user of water, outside of temperature control valves, is print washing. On the face of it, one would think that using resin-coated papers would automatically cut down on water consumption because they require only a short wash time, but in reality this is not always the case. If you are only going to make a single print in an evening, the resin-coated paper will obviously be faster to wash

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DARKROOM WATER- SAVING TIPS

and demand less water, but if you are printing a lot of pictures, the resin-coated paper will waste water like crazy.

For example, say you are making 20 8×10 enlargements from several negatives. With resin-coated paper you must wash for four minutes immediately after fixing because storage of the print in water will cause water to force chemical contamination into the edges of the paper and negate the quality of resin coating. Since you will be changing negatives and will be evaluating your enlargements as you go, you will be processing the prints one at a time. If you are very fast, you can probably focus, expose and process about one enlargement every five to 10 minutes. This means that each of your resin-coated prints will have to be washed alone for its entire four-minute period. Thus $20 \times 4 = 80$ minutes of total washing time during which water will be flowing.

On the other hand, had you used ordinary single-weight, glossy fiber-base paper, all of the prints could have been stored in a tray of water until the entire 20 prints had been completed. Then all 20 would have been treated for two minutes in hypo clearing agent and washed *together* in running water while hand shuffling prints to keep them separated. Wash time for all 20 prints would be only 10 minutes, and the water would be running for only 10 minutes. In other words, you would have run the water for only 10 minutes instead of 80, and you would have used only 1/8 as much water. By not using resin-coated paper you would save 88 percent of the water.

For some reason Kodak Hypo Clearing Agent is not used as much as it should be, and this great water saver is mostly avoided because of a misunderstanding in its packaging. Kodak packages are for five-gallon quantities, and this turns potential users away because they don't know what to do with all that extra solution. The fact is that there is no need to have a problem. Simply follow the instructions on the package and dissolve the entire contents in a single gallon of water to make up the concentrated solution. Then dilute one part concentrate with four parts water, I dilute 25.5 ounces of concentrate with enough water to make one gallon of working solution.

I use a tally system (one mark for



each 8×10 print) to keep track of the number of prints that go through the clearing agent and use a separate jug of clearing agent (diluted) for treating negatives. The print and negative solutions are the same strength, but sometimes I use some weird preparations in my experiments, and I like to keep the two separate. I find that the concentrate keeps for years in a tightly stoppered, half-empty jug, and the working solution is good for at least a year in a stoppered, nearly full jug. These times are much longer than Kodak recommends, but I'll get to testing later.

Meanwhile, the greatest enemy of clearing agents is the algae that will sometimes thrive on small amounts of gelatin that get into the partly used agent and grow to form a greasy or sticky slime. Examine the agent, best kept in a clear bottle, before use, and if you see little black globs of algae or slime, dilute a fresh batch and put it in a clean bottle. Note that the dark bottle (see photo No. 6) is used for concentrate where I've had no slime.

Once prints are out of the clearing agent and ready for their 10-minute wash, you have the choice of using running or still water to wash them. Properly used, still-water washing can be just as efficient as running water, and if you use the testing methods described here, you may find that still-water washing may actually be more

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35mm



DARKROOM WATER- SAVING TIPS

efficient than some running-water print washers that are touted as being "archival" or that seem to have very logical construction. If you elect to use a running-water print washer, you'll want to test it first to determine the minimum washing time you can get by with. You may find this to be longer than factory recommendations, but first let me elaborate on the tray washing process.

TRAY WASHING

The theory of washing can be explained by following what happens when washing one 8×10-inch negative—the equivalent of a 120- or 36-exposure 35mm roll in a small tank. A negative of this size, when removed from a standard fixing bath and placed in a tray of water, will carry about 11cc (ml) of fixing solution into the wash water. This amount of fixing solution will contain about 2.6 grams of hypo and a proportionate amount of other chemicals from the fixing solution. When an emulsion has been washed sufficiently to remove the hypo, these additional chemicals are also eliminated.

When placed emulsion-up in a tray of water, the hypo will diffuse from the emulsion into the water. This action will continue until there is an equal concentration of hypo in the emulsion and in the water immediately above the emulsion surface. The concentrated solution is heavier than the water and will lie in layers of different densities. Water agitation will equalize the concentration throughout the solution and thereby allow more chemicals to diffuse from the emulsion into the water. Continually changing water will lower hypo concentration, and washing is considered complete when there is only 1/100 of one-percent solution. However, theoretically at least, each square inch of emulsion would contain .033 milligrams of hypo. An emulsion containing this quantity of hypo would not be permanent.

Two additional water changes would reduce the amount of hypo remaining in the emulsion to such an extent that it will be permanent, provided it is not subjected to extremely adverse conditions. Therefore, 12 complete changes of water are usually considered sufficient for washing emulsions where hypo clearing agent has not been used to replace hypo in the emulsion prior to the start of the wash sequence. A complete change of water may be con-



sidered as one which involves a complete draining of the previous water, the use of a reasonable quantity of water at a temperature of 60 to 70°F., leaving the emulsions in the water from three to five minutes and including at least a slight amount of agitation of the emulsions during that time.

Although negatives and prints can be washed in the above manner using relatively small amounts of water, the necessary time is reduced by using more water, either by washing in a series of changes or by using a continuous flow. It has been proved that one complete change of water removes half the undesirable chemicals from a negative or print. A second change of water will eliminate half the remaining chemicals, and after a third water change, the emulsion will only retain 1/8 the original amount of chemicals. This explains the necessity of making the first three washings thorough, but it should be remembered that a prerinse in slightly contaminated water will speed things up much more. When the amount of chemicals remaining in a negative or print emulsion is halved in each successive water change, at the end of 10 changes only 1/1024 of the chemicals contained at the beginning will remain, and after 12 changes only 1/4100 will remain. This fractional part of chemicals remaining in a negative or print will not have a deleterious effect on the image.

Tests have proved that in washing it is much more difficult to eliminate chemicals from prints than it is from negatives because paper base fibers tenaciously retain chemicals. This is

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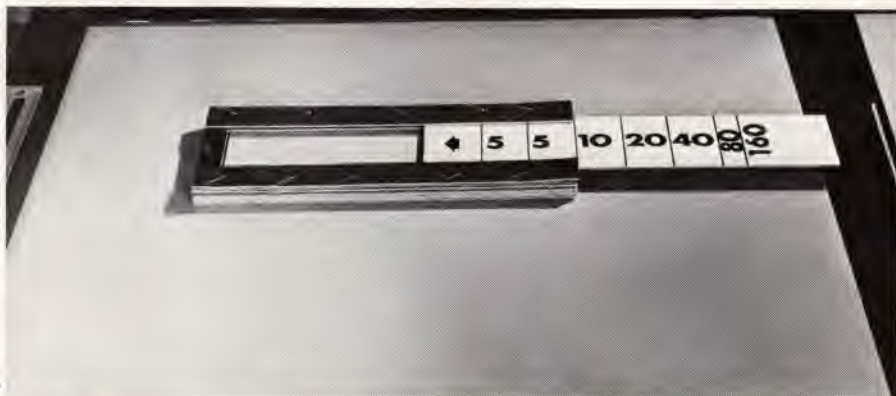
DARKROOM WATER- SAVING TIPS

more pronounced with double-weight prints than single-weight ones. For this reason working directions for washing negatives and prints specify a certain time for negatives, a longer time for single-weight prints and a yet longer time for double-weight prints.

TESTING PROCEDURES

To apply what you have learned from this technical discussion remember that the rinse between the fixing bath and clearing agent simply flushes away surface contaminants. The two- or three-minute stay in the clearing agent allows the chemicals in the agent to actually displace the hypo, etc., in the emulsion, making subsequent washing more rapid because chemicals in the agent are more easily washed out than those of the hypo. In addition, they tend to be less harmful to the finished print. Thus you will find that instructions generally call for a five-minute film wash in water that changes once every five minutes or one complete water change during the wash, provided that clearing agent has been used. Recommended wash for prints is 10 minutes for single weight and 20 for double weight in "running water," whatever that is. This means that for a two-reel 35mm tank you need 16 ozs. of water to initially fill the tank after clearing agent and 16 more to run through during the five-minute wash. Just one quart is used by the siphon method if you use a pinch clamp to reduce the flow of water through the siphon hose.

To wash single-weight prints after clearing agent line up five trays of water, left to right. Put prints in first tray at left and agitate for two minutes, move to the right one tray and agitate two minutes. Continue until prints have passed through a two-minute agitation in final tray. With the next batch of prints to be washed add a sixth tray of fresh water at right and pass prints through all six trays. Next batch, empty first tray and move all solutions (waters) one tray to left, then fill sixth tray (on right) with clean water for final wash. For each additional batch of prints move solutions to left by one tray, always adding fresh water to refill the sixth tray on right. In chemical engineering this is known as countercurrent washing, as the most contaminated prints go into the dirtiest water first. And while prints flow to right, water flows to left for minimum use of water



and maximum washing efficiency.

To determine just how effective your washing methods are, you should perform a chemical test that is both simple and accurate. Make test solution with distilled water if possible, but clean tap water without heavy contamination of organic matter or industrial waste will work as well. Potassium permanganate crystals can be obtained from a chemical supply house, or your druggist can order them if he does not have them in stock. Household lye, available at the grocery store, can be substituted for sodium hydroxide.

HYPO TEST SOLUTION

Water (60° to 70° F): 8 ozs. or 237ml(cc)

Potassium permanganate: 4 grs. or .26g
Sodium hydroxide: 8 grs. or .52g

Use 15 drops test solution added to 8 ozs. (250cc) water, preferably distilled. Pour ½ oz. (15 cc) of this solution in a small glass or graduate. Take two 8×10 prints from wash water, drain hurriedly and allow drippings to fall into half ounce of solution for 30 seconds. The least trace of hypo in the water draining from the prints will

cause this violet solution to turn to an orange color. If more hypo is present in the drippings, the solution will change to a greenish yellow color. As certain impurities in water will cause similar discoloration of the solution, a number of drops of tap water, equivalent to the number of drops from the prints, should be dropped into a different half ounce of diluted test solution. If no change in color takes place, any change in color that will take place from the water drained from prints will be due to the presence of hypo, which will prove that the prints have not been sufficiently washed.

Since most of my readers are not chemists, I suggest you try adding one drop of used hypo solution to about 250cc of water, stir, and then add about 10 drops, one at a time, of this contaminated water to a ½ ounce of diluted hypo test solution. This allows you to see color changes that take place as more and more hypo contamination reaches the permanganate.

Unlike most tests that require the use of silver nitrate and the destruction of the white print borders, this test is completely nondestructive and can be used for prints with no borders at all. It can also be used for testing your film washing technique. I have thoroughly tested it with emulsions that have been passed through clearing agent as well as with ones that have been simply washed after fixing. It works well with both. It does not test the residual silver salt concentration, which doesn't matter. I say this because testing the residual silver salt concentration in one isolated spot on the border of a single print tells you nothing whatsoever about the rest of the prints that have been washed in the same batch or subsequent batches. The Kodak HT-2 test, for instance, is masked by warm-toned paper bases, is destructive in direct testing, stains everything it touches and is less safe to have around than the solution I recommend.

Caution: Potassium permanganate

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DARKROOM WATER- SAVING TIPS

and sodium hydroxide require common sense in handling and should be kept out of reach of children. Both sodium hydroxide used above and silver nitrate used in Kodak's HT-2 are caustic and should *not* be allowed to touch the skin. If accidentally touched, immediately flush with cold water and wash with soap and water. If you get permanganate crystals or solution on your skin, flush with cool water and dip effected area or swab it with ordinary hypo (fixing) solution, then wash again. The permanganate test solution as compounded is harmless so long as you don't drink it or let it get in your eyes.

If you don't have the facilities for weighing out chemicals, your druggist or any friendly chemist can do it for you. Use waxed paper or glass to protect scale from sodium hydroxide (lye), as it takes up water and forms a sticky material that will corrode some metals, and weighing should be done rapidly, as the absorbed water will be weighed as well.

A lot of photographers are unsuccessful because they just can't bear to throw anything away. If you are one of these types, I recommend you use test strips and strippers (see photo No. 7) to eliminate an excess of under- and overexposed prints. If you find a print is not up to standard, discard it directly from the hypo, don't waste water washing it later. If you really goof, you'll know it when the print's in the

developer so just dip it in the stop bath and throw it out right then. Save that water for washing your masterpieces, not your master messes!

FINAL WORDS

Judging from letters I get, many of PhotoGraphic's readers are pros or part-time pros who are climbing the walls trying to stay within their water rations. For those of you among this group, I recommend the solution shown in photo No. 9. An inexpensive stabilization processor combined with the right chemicals and paper will provide excellent prints with sufficiently good keeping qualities to use as proofs for customers or sale to magazines and newspapers that can be expected to store them in standard (out of the sunlight) files and keep them less than one year. Complete processing takes less than half a minute and yields a damp-dry print. A half hour on any flat surface, and you have a completely dry print ready for mailing.

Just for the record, I live in a severe water shortage area, and I'm saving my water ration to wash my big exhibition prints. All photos accompanying this article were printed on Kodak Ektamatic SC single-weight F-surface paper and processed in A10 activator with S30 stabilizer in the Speedee processor (photo No. 9).

Stabilized prints can be made permanent by fixing and washing later, should the need arise, and more affluent nonpros might consider this as a stopgap measure until the rains come again. □

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BLUEPRINT SERIES

How To Find a Standard Film Developing Time

BY WALT SENG

PROJECT: To find the film developing time that suits your enlarger, paper, materials and method.

PURPOSE: To insure that higher zone values on negative will appear as planned on print.

EQUIPMENT: 1. Same gray-card shooting setup as that used for film speed test in "Blueprint," August, 1977 issue; 2. Three rolls of 35mm or 120 film or 24 sheets of large-format film; 3. Your normal film developer (such as Kodak D-76 or HC-110); 4. Processing equipment; 5. Accurate thermometer; 6. Pencil and notepad.

PROCEDURE GUIDE: Your standard film developing time will be the time needed to render a negative's Zone VIII designation as a Zone VIII print value. Remember to expose film at your working film speed as determined in the film speed test. This will give you a proper and designated Zone I value.

All procedures must be consistent and repeatable. This is achieved by paying strict attention to time, temperature and method of film agitation in developer. Proper agitation procedure is given in "Film Agitation" chart for roll and sheet film processing.

PROCEDURE: Set up your gray card, lights and camera according to the directions given in "Blueprint," August, 1977. Set exposure meter at your working film speed. Make a series of exposures to provide zone values I through VIII. (Remember that your meter gives a Zone V reading. A Zone I reading will be the equivalent of four stops underexposure; Zone VIII value will be three stops over. Each zone value represents the difference of one full stop exposure.) Expose three rolls of film or three sets of eight sheets of film to the various



1. Test's success depends on exactness of timing, temperature and method.

zones. For roll film users expose remaining frames to Zone V or shoot some pictures to balance out developer's action.

Develop one roll or one set of eight sheets of film according to manufacturer's recommendation. Follow agitation plan given in "Film Agitation" chart. Do not overfix. Wash and dry film.

Set up enlarger at height used for your usual negative

magnification. Set f-stop and timer for your Standard Printing Time (obtained by following method described in "Blueprint," September, 1977 issue). Focus lens on negative carrier's edge.

Using Zone VIII negative value, make a print on your normal paper while covering half of sheet with an opaque card. Process print normally, fix and dry. Compare Zone VIII value to white paper. If



2. By printing all zones at your "standard printing time" and mounting prints on a card, you have made a "Zone Ruler," which can be used later to compare zones in actual shooting situations.

FILM	FILM AGITATION DEVELOPING TIME	AGITATION TIME
Sheet film in tray.....		Constant
Sheet film in large tank.....	Up to 5 min.....	Constant
	5 to 10 min.....	8 sec. each 30 sec.
	10 to 20 min.....	15 sec. each min.
	Over 20 min.....	15 sec. each min., then agitate 1 min. every 5th min.
Roll film in small tank.....	Up to 5 min.....	Constant
	5 to 10 min.....	5 sec. each 30 sec.
	10 to 20 min.....	10 sec. each min.

For all films use constant agitation during first minute. Consult manufacturers' product sheets for time and temperature information. Use this as a starting point. Your personal film developing time might vary as much as 25 percent from the time suggested by the film's manufacturer.

You may decide to presoak your film in water (same temperature as developer) to condition it to accept developer

more evenly. This is a must for preventing tray-developed sheet film from sticking to adjacent sheets of film.

When processing roll films, fill tank with developer and then drop in film. This will prevent streaking and time loss due to pouring action.

Agitate small tank by simultaneously inverting and rotating it for three complete cycles every five seconds. Rap tank on a hard surface after each agi-

tation period to dislodge any air bubbles clinging to film.

To measure small quantities of developer such as HC-110 use a syringe or capillary-type measuring device. Rinse premeasured water and add to working solution to insure proper dilution.

Suggested dilution for D-76 and similar developer is 1:1; for HC-110, Dilution B use 1:7 if from stock, 1:31 if taken from concentrate.

your Zone VIII value is darker than a pale gray, you must increase your developing time; if it comes out white, you must decrease your developing time. When a change in developing time is necessary, add or subtract 25 percent to/from the time accordingly. Process another roll or set of sheets for your new estimated developing time. Repeat printing procedure and check your new Zone VIII print value. You might still find it necessary to fine-tune your developing time. Once it's established, you can use it for all film of that speed that calls for normal development.

Next print all remaining neg-

atives of correctly processed film at your Standard Printing Time on 4x5-inch sheets of paper. (After establishing Zone VIII print density, all the other zones will fall into place.)

Mount prints to form a "Zone ruler" as shown in photo No. 2. Don't forget to include standard black and white patches in the ruler. This Zone ruler will be used in the test described in next month's "Blueprint."

GENERAL DISCUSSION: With these last three "Blueprints" on the Zone System you have expended a good deal of time and concentrated effort matching your equipment, ma-

terials and methods to achieve good processing and printing technique. You have determined your working film speed, established your Standard Printing Time and found the correct developing time for your normal negatives. You would be wise to gain complete confidence in your newly tested materials before experimenting with materials with which you are unfamiliar. Later on you can test a new film, developer or paper to exploit its expressive capabilities. When you feel you are ready to try new materials, test them to insure that you will be able to utilize their full potential. © Walt Seng, 1977 □

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OTHER VOICES

(Continued from page 26)

fort. When theory ceases to advance this effort it becomes lifeless dogma. Thus, to quote Ben Helprin (see "Self-Assignment," August, 1977 issue), "All... dictums are right for those who share the same purpose and wrong for those who do not."

Photography may offer the greatest diversity of expressive technique of any medium yet devised. From this far-reaching range of possibilities we must each find our own path, guided but not confined, by the markers given us by others. All theory, if it is to be useful, must work toward the achievement of an artistic/instructional purpose and not behave as though it were an end in itself.

I'll close by paraphrasing Alfred Stieglitz: It is the end result (the image and the response that it produces) and *not* the method or technique that is all important.

Glen L. Doll

Los Angeles, California

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Question: When will the other paper manufacturers come out with resin-coated stabilization papers? I hope they get the opportunity to read this letter.

Jim Hood

Portland, Oregon

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OCTOBER

October 1, 2, 30
HASSELBLAD ONE-DAY
SEMINARS—SEEING THROUGH THE
CAMERA

(Scheduled for the cities of
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on the above corresponding dates)
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Braun North America
55 Cambridge Parkway
Cambridge, Massachusetts 02142

October 1-31
NIKON SCHOOL OF
PHOTOGRAPHY—CAMERA BASICS
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Boise, Chicago, Ft. Wayne, Des
Moines, Wichita, Baton Rouge,
Boston, St. Louis, Newark,
Albuquerque, New York City,
Raleigh, Tulsa, Lancaster,
Philadelphia, Pittsburgh and
Houston)

623 Stewart Avenue
Garden City, New York 11530

October 1-7
BIOMEDICAL PHOTOGRAPHY WEST
COAST WORKSHOP
Brooks Institute of Photography,
Santa Barbara
Stephen R. Sampley
P.O. Box 3626
Rancho Los Amigos Station
Downey, California 90242

SEMINARS & WORKSHOPS calendar

October 3-November 25
SUN VALLEY CENTER INTENSIVE
PHOTOGRAPHY WORKSHOP
Sun Valley Center for the Arts and
Humanities
Box 656

Sun Valley, Idaho 83353

October 3-7
FALL FOLIAGE SEMINAR
(With Geri Vartanian)
Woodstock, Vermont
Geri Vartanian
150 East Hartsdale Avenue
Hartsdale, New York 10530

October 3-5 and 6-8
SOUTHERN SCHOOL OF
PHOTOGRAPHY FALL FOLIAGE
WORKSHOPS
Rockville, Indiana
Southern School of Photography
517 Thornhill Road
Fort Walton Beach, Florida 32548

October 6-8
THE SHELDON MEMORIAL ART
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October 9-15
OWENS VALLEY WORKSHOP AT
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P.O. Box 225
Agoura, California 91301

October 10-12, 13-15, 17-19, 20-22,
24-26 and 27-29
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☐ "You are an egghead!" was accusingly tossed at me by an old friend and colleague at a recent dinner party. Admittedly, the relaxed conviviality of the evening and my ever-ready eagerness to sum up the most recent books that I have read probably led to what seemed to me to be a rather startling personal label. And this label, while not offensive in academic circles, has in its origins the tone of an individual distinguished by his/her disposition to penetrate subjects beyond the usual depths required in casual conversation. In this case, my "sin" was to have dallied in fields not immediately related to photography.

This attitude reflects a serious cultural malady found in many educators—the defect of closed-mindedness to the possibility and significance of worlds or territories outside their own. If we can believe that substantial defects are related to survival, then it would seem reasonable to consider the future of photographic education in this light.

The defect I am alluding to might be compared to a certain "telephoto-mindedness" in photo educators, rather than a wide-angle view of education as a whole. This narrow approach might eventually lead to a selective "axing" of the photo program by beleaguered taxpayers, much as Mother Nature in past eons disposed of unadaptive creatures by a simple process of elimination.

It is my contention that the continued presence of many high school photography classes has been dependent on the lack of administrative bureaucratic skills to deal with the novel situation of enthusiastic students demanding such a course. However, enthusiasm is not sufficient to insulate such classes from the consequences of a limited budget; in this area the "system" has had a great deal more practice, and the photo program might find itself underfunded and relegated to the lowest position of the pecking order by colleagues who have discovered, refined and broadened their own techniques for survival.

What has gotten high school photography into this predicament of overspecialization (or blessing, depending on how one sees it) is an interesting set of circumstances that has left photography adrift on its own little island of specialty—equipment, processes and enthusiasm—referred to later on in this article. Meanwhile, back on the educational mainland,

camera ON CAMPUS

ROBERT ROUTH

ON BEING SOFT-BOILED ABOUT EGGHEADS

think tanks were beginning to discover scientific reasons why educators should begin to pay more attention to the visual image. The consequences of this foray into so-called "visual literacy" could take on stampede dimensions with the same flurry of excitement as the last big educational gold rush—progressive education (no value judgment intended).

An interesting question is what impact this act would have on high school photography education as we now know it. Doubtless, some programs will continue blissfully unaware of outside currents, sustained by supercharged students and die-hard teachers who, in my opinion, dabble around in the scrub grass of technique and process when they could be grazing in the lush meadows of sophisticated communications techniques. Others will find themselves sucked into the position of becoming a service wing of the three "Rs" and will dutifully dole out photographs to enrich visually attuned schools.

As readers have no doubt guessed by now, I see high school photography education in a much broader sense than a prep course for a hobby or a caboose on someone else's special train of thought. It was, of course, my inclination to read extensively, gradually developing a personal framework in which photography fits as a remarkable accessory rather than a world unto itself. It was my verbal rebellion against such narrow specialization that led to the tag, "egghead," which in turn led to this article.

Findings from the national survey of high school photography teachers and other programs have led me to believe that if there is a failure in the high school photography teacher to broaden his/her goals, it is probably due to: 1. lack of formal photographic education; 2. the practice of building his/her curriculum around areas of personal photographic interest; 3. initial student interest in primarily the magic of the process; 4. involvement with classes other than photography; 5. lack of organizational support.

Ironically, though, the same tools and techniques that can lead to a

famine of originality seem to also lead to a feast of visual ideas. Such a possibility is inherent in the fact that 68 percent of the surveyed high school photo teachers felt they did not have sufficient equipment, space and projects to keep students occupied during class time. If, by this response, we can assume that many students—for whatever reasons—are sitting around with nothing to do, then it seems to me that as conscientious teachers, we should be asking ourselves some rather introspective questions regarding our curriculum and our territory.

We might broaden this territory to include the generally neglected communicative aspects of photography—learning something about why and how the visual image affects our thinking, our buying, our actions. Prominent researchers have credited visual images with being a major force in determining the culture of contemporary society. The study of the visual image might, in fact, be approached as a survival technique for contemporary living. In such a photography class students could explore ways of coping with the incessant parade of images on TV, in newspapers, books and magazines.

While I am not personally distressed by the label "egghead," I am saddened to observe that some educators place such confining limitations on themselves. We are in the continuing business of learning and presenting options in our teaching, not only options dealing directly with our subject but options in our teaching methods and scope of curriculum. In a very real sense, we are being paid to think. This means discovering and testing new ideas. This implies learning about the other fellow's territory. This suggests putting together—with elastic bands for stretching and changing—our own philosophy of what education is all about—offering our students, for acceptance or rejection, our personal, unique qualities as teachers and as concerned, interested human beings in a complex, visual society.

Maybe being called an "egghead" isn't so bad, after all. □

* * *

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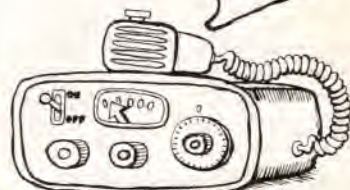
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(Continued from page 121)



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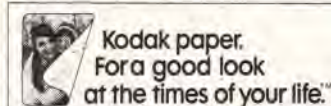
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Aardvark & Son	115
AIC Photo, Inc.	65
Antonelli School of Photography	121
Arga Photo	120
Aristo Grid Lamp Products, Inc.	118
Asanuma Corp.	35
Ascor, Div. Berkey Marketing Co., Inc.	101, 102, 103
Associated Photographers International	87
Bell & Howell/Mamiya Co.	42-43
Bencher, Inc.	116
Berg Color-Tone, Inc.	121
Beseler Photo Marketing Co., Inc.	17C, 27
Blackhawk Films, Inc.	114
Bolex, E.P.O.I., Inc.	63
Brantronics Corp.	126
Braun, Div. Braun North America	52
Bridal Studios	126
Bronica, Div. E.P.O.I., Inc.	104
Cal Pro	123
Calumet Scientific, Inc.	108
Canon U.S.A., Inc.	28-31
Chinon Corp. of America	41
Color Only	117
Contemporary Frame Co.	26
Creative Framemakers	123
Creative Photography	114
Crown Products, Div. Chilcote Co.	126
Custom Quality Studio	127
Da-Lite Screen Co., Inc.	26
Eastman Kodak Co.	13, 23, 57, 64, 68, 92, 97, 102, 107, Cover 4
Elmo Manufacturing Corp.	68
Falcon Safety Products, Inc.	67
Fishback School of Photography	114
Fortune Photographic Products	119
Glory-B of Santa Barbara	56
Peter Gowland Productions	114

advertising index

Hasselblad, Div. Braun North America	21
H-L, Inc.	116
Ilford, Inc.	5
Interstate Color Lab, Inc.	124-125
Jet Color Lab	122
Kearsarge Industries, Inc.	123
Kelly Color	126
K-Mart	110
Konica Camera Corp., Div. Berkey Marketing Co., Inc.	24-25
Larson Enterprises	70
Laurel Photographic Books, Inc.	71
Leedal, Inc.	87, 120, 121
Photography by Lessnau	116
Livingston Press	56
Maxwell Photo-Mural Tanks	126
Miller/Sountage	126
MinMax, Inc.	69
Minolta Corp.	2-3, 48
Mornick Div., Cosar Corp.	71
Nano-Tech	120
National Camera	84
New York Institute of Photography	36
Nikkormat, Nikon, Inc.	Cover 2
Nikon, Nikon, Inc.	14-15, 66, 85
Nikon School	69
Novacon Products	123
Olden Camera & Lens Co.	114, 121
Olympus, Vivitar, Inc.	6-7
Omega, Div. Berkey Marketing Co., Inc.	19
Pentax Corp.	Cover 3
Pfefer Products	117, 120
PFS	116

Photography Learning Systems	123
Photo Mates	121
Photo Specialties Co.	120
Photo-Therm	126
Pierce Co.	123
Portertown Products, Inc.	86
Positive Color Professional Labs	114
Pro Color, Inc.	126
Pro Photo	120
Redding Co.	114
Rhode Island School of Photography ..	116
RMF Products, Inc.	126
Rockland Colloid Corp.	119
Rodenstock, Div. Berkey Marketing Co., Inc.	66
Rolux Watch U.S.A., Inc.	49
RPS Products	120
Schiffelin & Co.	109
The School of Modern Photography	8-9
Seal, Inc.	37
Sebulex, Div. Westwood Pharmaceutical Co., Inc.	113
Sigma, E.P.O.I., Inc.	96
Starfire	126
Staticmaster, Nuclear Products	123
Stormy Dawn Color Lab	120
Studio W	120
Sunpak, Div. Berkey Marketing Co., Inc.	11
Testrite Instrument Co.	126
Time-Life Books	17A, B
20th Century Plastics, Inc.	51
Unicolor, Div. Photo Systems, Inc.	55
Visual Horizons	116
Vivitar Darkroom, Vivitar, Inc.	32
Vivitar Flash, Vivitar, Inc.	95
Vivitar Optics, Vivitar, Inc.	58, 59, 100
Wedding Photographers of America, Inc.	118
Zone V	117
Zone VI Workshop	70

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"During the last year I have seen several outstanding black-and-white photographic exhibits. These experiences, plus my now having space for a darkroom, have really worked up my enthusiasm to a high point. I have been taking pictures for some time but mostly color slides, so my expertise in black-and-white is not at all equal to my enthusiasm. I did take a class in basic developing and printing not long ago, but there are obviously much more refined techniques involved in making exhibition prints than the basics I learned. Can you let me know of some references that will steer me in the right direction?"—Jan Grodinski, Washington, D.C.

There are a number of authors whose work and texts have provided guidance and inspiration for many photographers. Among the best known are Ansel Adams, Minor White and Fred Picker. But before becoming enmeshed in the intricacies and refinements of technique of one particular master photographer, I would suggest you take a broad overview of the many image styles that are exhibited and the methods employed in creating those prints.

Just recently a new book was published by Lustrum Press that is a rewarding marriage between a collective picture book and a how-to-do-it text. *Darkroom*, edited by Eleanor Lewis, contains a detailed insight into the processing and printing techniques of 13 notably diverse master craftspeople, all of whom have been widely exhibited. Each photographer describes in his/her own words what materials he/she relies on, how they are used and, probably most significantly, why the materials and processes are used. Distinctly characteristic images of each photographer's work are given, illustrating the relationship between the individual's attitudes toward the darkroom function and how it is a part of the total picture-making process.

The reader can immediately comprehend the purpose and function of a procedure as it affects the photographer's intent with regard to a particular aspect of image quality. I'm sure it was not the editor's intention to set the individual photographers up for comparison, but it is inevitable. And if the reader chooses to look for them, some significant differ-

ONE TO ONE

DAVID B. BROOKS

DARKROOM ILLUMINATION

DARKROOM

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JERRY BURCHARD
LINDA CONNOR
LARRY CLARK
RALPH GIBSON
BETTY HAHN
EIKOH HOSOE
GEORGE KRAUSE
ELAINE MAYES
DUANE MICHALS
W. EUGENE SMITH
GEORGE TICE
JERRY UELSMANN

EDITED BY ELEANOR LEWIS

LUSTRUM PRESS

Every photographer interested in black-and-white work will find much to intrigue and much to inform in *Darkroom*. Edited by Eleanor Lewis and published by Lustrum Press for distribution by Light Impression Corporation, Box 3012, Rochester, New York, it is available for \$15.

ences and similarities will soon be discovered. The relationship between the individual photographer's attitude toward images, the choice of subject and the technical approach are all more clearly understood in the context of contrasting images and feelings of other photographers.

The contributors to *Darkroom* represent a wide spectrum in the field of exhibited photography. Included are long established photographers such as the outstanding pictorialist Wynn Bullock and the incomparable photographer/journalist of the human condition, W. Eugene Smith. Younger photographers like Linda Connor, Betty Hahn, George Krause and George Tice have taken printing techniques from photography's formative years and applied them to contemporary subjects.

Jerry Burchard and Larry Clark have taken specific processes that have been little used for many years and integrated them into an otherwise contemporary technique. Eikoh Hosoe, Ralph Gibson and Elaine

Mayes all employ modern means to control image character in three very different and distinct styles. Duane Michaels' camera technique and vision of the subject are free and flexible, reflecting a very personal conceptualization supported by a simple, straightforward and conventional processing procedure. Jerry Uelsmann's imaginative, intricately conceived, multiple-image printing procedure appropriately closes the book.

Darkroom will have many different values for each reader depending on individual interests and backgrounds. A basic understanding of general photography including developing and printing will be necessary to fully appreciate the book. First of all just a straight-through reading is interesting and even quite entertaining at times, a characteristic that few how-to books and pure reference works ever offer.

It would be hard to commend a book so thoroughly for such broad application if it were not so well laid out and organized. Identification and access to the information in the book are facilitated by carefully thought-out separation of the material. Exhibition images are well distinguished and segregated from the text and explanatory illustrations. Special formulas are set in blocks of different type, and all identification of materials, chemicals, times and temperatures are given in a single, one-page chart for each photographer.

I believe the eclectic nature of *Darkroom* is in principle the most rewarding approach to finding a way of making an individualized technique to produce exhibition prints. No one resource, no one teacher can be expected to serve as a completely comprehensive guide for an individual to find the exact combination of materials and processes that will produce the unique character of an image visualized. Information of all kinds from all sources, whether broad and general like Amphoto's *Photo Lab Index* or the diverse publications of Eastman Kodak, to the obscure bits and pieces from old books and journals found hidden away in the dusty corners of a local library, is the necessity for selection. The process of application to your specific needs is carefully controlled experimentation, testing and eliminating or encompassing each element of technique one by one. □

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